

REPORT NUMBER: NCAP-MGA-23-014

**NEW CAR ASSESSMENT PROGRAM (NCAP)
Frontal Barrier Impact Test**

**MAZDA TOYOTA MANUFACTURING U.S.A., INC.
2023 Mazda CX-50 AWD 5-Door SUV
NHTSA No.: M20235400**

**MGA RESEARCH CORPORATION
5000 Warren Road
Burlington, WI 53105**



Test Date: March 28, 2023

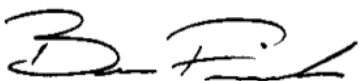
Final Report Date: December 28, 2023

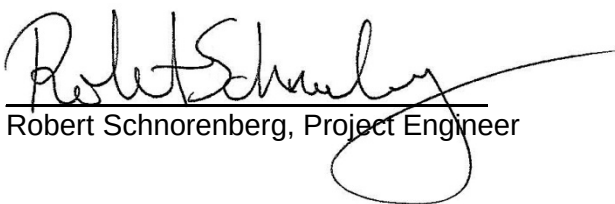
FINAL REPORT

**U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Office of Crashworthiness Standards
1200 New Jersey Ave, SE
Washington, DC 20590**

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Approval Date: December 28, 2023

FINAL REPORT ACCEPTANCE BY OCWS:

Division Chief, New Car Assessment Program
NHTSA, Office of Crashworthiness Standards

Date: _____

COTR, New Car Assessment Program
NHTSA, Office of Crashworthiness Standards

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16. Abstract A 56.3 km/h NCAP Frontal Rigid Barrier Impact Test was conducted on a 2023 Mazda CX-50 AWD 5-Door SUV in accordance with the specifications of the Office of Crashworthiness Standards Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing. The test was conducted at MGA Research Corporation in Burlington, Wisconsin on March 28, 2023. The impact velocity of the vehicle was 56.23 km/h and the ambient temperature at the barrier face at the time of impact was 20.7°C. The target vehicle post-test maximum crush was 529 mm located at the vehicle centerline. The test vehicle's performance was as follows: <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD</th> <th colspan="2">Passenger ATD</th> </tr> <tr> <th>Threshold</th> <th>Result</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td></td> <td>700</td> <td>99.701</td> <td>700</td> <td>211.005</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>23.653</td> <td>52</td> <td>14.274</td> </tr> <tr> <td>Nij</td> <td></td> <td>1</td> <td>0.232</td> <td>1</td> <td>0.220</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>928.351</td> <td>2620</td> <td>471.434</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>48.715</td> <td>2520</td> <td>329.474</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>986.206</td> <td>6805</td> <td>1175.907</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>974.383</td> <td>6805</td> <td>1541.893</td> </tr> </tbody> </table>						Measurement Description	Units	Driver ATD		Passenger ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)		700	99.701	700	211.005	Maximum Chest Compression	mm	63	23.653	52	14.274	Nij		1	0.232	1	0.220	Neck Tension	N	4170	928.351	2620	471.434	Neck Compression	N	4000	48.715	2520	329.474	Left Femur Force	N	10008	986.206	6805	1175.907	Right Femur Force	N	10008	974.383	6805	1541.893
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TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	Purpose and Summary of Test	1
2	Occupant and Vehicle Information / Data Sheets	3
 <u>Data Sheet No.</u>		 <u>Page No.</u>
1	General Test and Vehicle Parameter Data	4
2	Seat Adjustment, Fuel System, and Steering Wheel Data	8
3	Dummy Longitudinal Clearance Dimensions	10
4	Dummy Lateral Clearance Dimensions	11
5	Seat Belt Positioning Data	12
6	High-Speed Camera Locations and Data	13
7	Vehicle Accelerometer Locations	15
8	Photographic Reference Target Locations	16
9	Load Cell Locations on Fixed Barrier	17
10	Test Vehicle Summary of Results	18
11	Post-Test Observations	19
12	Vehicle Profile Measurements	20
13	Accident Investigation Division Data	22
14	Vehicle Intrusion Measurements	23
15	Summary of Indicant FMVSS No. 212 and FMVSS No. 219 (Partial) Data	25
16	FMVSS No. 301 Barrier Impact and Static Rollover Results	26
17	Dummy/Vehicle Temperature Stabilization Data	28
 <u>Appendix</u>		
A	Photographs	A
B	Dummy Response Data Traces	B
C	Dummy Qualification and Performance Verification	C
D	Test Equipment and Instrumentation Calibration	D

SECTION 1 PURPOSE AND SUMMARY OF TEST

PURPOSE

This 56.3 km/h frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number 693JJ919D000006. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

The 56.3 km/h frontal barrier impact was conducted in accordance with the Office of Crashworthiness Standards Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing.

SUMMARY

A load cell barrier consisting of 176 load cells was impacted by a 2023 Mazda CX-50 AWD 5-Door SUV at a velocity of 56.23 km/h. The test was performed at MGA Research Corporation on March 28, 2023. Pre-test and post-test photographs of the vehicle and dummies can be found in Appendix A.

Two (2) real-time cameras and sixteen (16) high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

One Part 572E 50th percentile male anthropomorphic test device (ATD), was placed in the driver seating position and one Part 572O 5th percentile female test device (ATD) was placed in the right-front passenger seating position according to dummy placement instructions specified in the Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing.

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were installed on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading.

The driver (position 1) ATD (Serial No. 351) and the right-front passenger (position 2) ATD (Serial No. 142) were qualified previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 634 channels of data were recorded on a data acquisition system. Appendix B contains the dummy response data traces.

There was 100 percent windshield retention and no intrusion into the protected zone of the windshield during the event. There was no Stoddard Solvent leakage after the event or during any phase of the static rollover.

The maximum static crush of the vehicle was 529 mm located at the vehicle centerline and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

The driver's visible contact points were as follows: The driver's head contacted the airbag. The driver's head also contacted the headrest. The driver's knees contacted the knee airbag.

The passenger's visible contact points were as follows: The passenger's head contacted the airbag. The passenger's head also contacted the headrest. The passenger's knees contacted the knee airbag.

The occupant data is summarized below:

ATD position	HIC₁₅	Nij	Neck Tension (N)	Neck Comp. (N)	3ms Chest Clip (g)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50 th)	99.701	0.232	928.351	48.715	35.684	23.653	986.206	974.383
Passenger (5 th)	211.005	0.220	471.434	329.474	43.761	14.274	1175.907	1541.893

The test data can be found on the NHTSA website at www.nhtsa.gov

TEST NOTES

Passenger Pelvis Z recorded no valid data.

MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes.

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
Test Date: 3/28/2023

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20235400	Traction Control System (TCS)	Yes
Model Year	2023	Power Steering	Yes
Make	Mazda	Power Window Auto-Reverse	Yes
Model	CX-50 S AWD	Driver Frontal Airbag	Yes
Body Style	5-Door SUV	Driver Curtain Airbag	Yes
VIN	7MMVABCM5PN125585	Driver Head/Torso Airbag	No
Body Color	Wind Chill Pearl	Driver Torso Airbag	No
Odometer (km/mi)	23 km / 14 mi	Driver Torso/Pelvis Airbag	Yes
Engine Displacement (L)	2.5 L	Driver Pelvis Airbag	No
Type/No. Cylinders	Inline 4	Driver Knee Airbag	Yes
Engine Placement	Lateral	Front Pass. Frontal Airbag	Yes
Transmission Type	Automatic	Front Pass. Curtain Airbag	Yes
Transmission Speeds	6	Front Pass. Head/Torso Airbag	No
Overdrive	Yes	Front Pass. Torso Airbag	No
Final Drive	AWD	Front Pass. Torso/Pelvis Airbag	Yes
Roof Rack	No	Front Pass. Pelvis Airbag	No
Sunroof/T-Top	Yes	Front Pass. Knee Airbag	Yes
Running Boards	No	Driver Pretensioner	Yes
Tilt Steering Wheel	Yes	Driver Load Limiter	Yes
Power Seats	Yes	Front Pass. Pretensioner	Yes
Anti-Lock Brakes (ABS)	Yes	Front Pass. Load Limiter	Yes
Automatic Door Locks (ADLs)	Yes	Other	N/A

Does owner's manual provide instructions to turn off automatic door locks?	Yes
--	-----

DATA FROM CERTIFICATION LABEL

Manufactured By	MAZDA TOYOTA MANUFACTURING U.S.A., INC.	GVWR (kg)	2199
Date of Manufacture	11/22	GAWR Front (kg)	1133
		GAWR Rear (kg)	1079

VEHICLE SEATING AND WEIGHT CAPACITY DATA

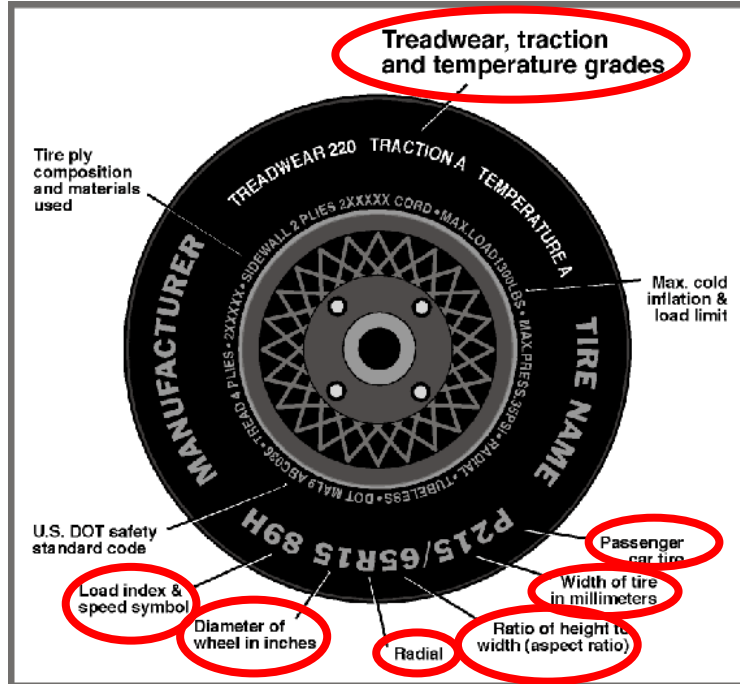
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Contoured		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				385
Cargo Weight (RCLW) (kg)				45

DATA SHEET NO. 1 (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
 Test Date: 3/28/2023

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	250	250
Recommended Tire Size	225/65R17	225/65R17
Tire Size on Vehicle	225/65R17	225/65R17
Tire Manufacturer	Goodyear	Goodyear
Tire Model	Assurance	Assurance
Treadwear	540	540
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Polyamide	1 Polyester, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	102H	102H
Tire Material	Rubber	Rubber
DOT Safety Code Left	1M62Y NTIR 1422	1M62Y NTIR 1422
DOT Safety Code Right	1M62Y NTIR 1322	1M62Y NTIR 1422

DATA SHEET NO. 1 (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
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TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	494.0	343.0		524.0	412.0	
Right	kg	471.5	355.0		492.0	414.0	
Ratio	%	58.0%	42.0%		55.2%	44.8%	
Totals	kg	965.5	698.0	1663.5	1016.0	826.0	1842.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1663.5
Weight of 1 P572E ATD & 1 P572O ATD	kg	141
Rated Cargo/Luggage Weight (RCLW)	kg	45
Calculated Test Vehicle Target Weight (TVTW)	kg	1849.5

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	791	793	794	804	1181
As Tested	mm	776	777	775	781	1262
Post Test	mm	842	823	788	766	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2815
Total Vehicle Length at Left Side	mm	4500
Total Vehicle Length at Centerline	mm	4717
Total Vehicle Length at Right Side	mm	4500
Weight of Ballast in Cargo Area	kg	11
Weight of Vehicle Components Removed	kg	28
Amount of Stoddard Solvent in Fuel Tank	L	56.0

List of components removed to meet test weight: Cargo area carpet/trim/divider, LR/RR floor mat, spare tire and cover, RR taillight, front underbody plastic.

List of components removed for instrumentation, data box, and equipment installation: None.

DATA SHEET NO. 1 (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
 Test Date: 3/28/2023

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4717
2	Total Width	1936
3	Bumper Top Height	611
4	Bumper Bottom Height	500
5	Longitudinal Member Top Height	650
6	Distance between Longitudinal Members	912
7	Longitudinal Member Width	71
8	Engine Top Height	895
9	Engine Bottom Height	400
10	Engine and Gearbox Width	821
11	Front Bumper-Engine Distance	364
12	Front Shock Absorber Fixing Height	922
13	Bonnet Leading Edge Height	945
14	Front Shock Absorber Fixing Width	1241
15	Front Bumper – Front Axle Distance	737
16	Front Axle – A-Pillar Distance	500
17	A-Pillar – B-Pillar Distance	1085
18	B-Pillar – Rear Axle Distance	1244
19	B-Pillar – C-Pillar Distance	800
20	Roof Sill Bottom Height	1522
21	Roof Sill Top Height	1585
22	Floor Sill Bottom Height	310
23	Floor Sill Top Height	420

DATA SHEET NO. 2
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

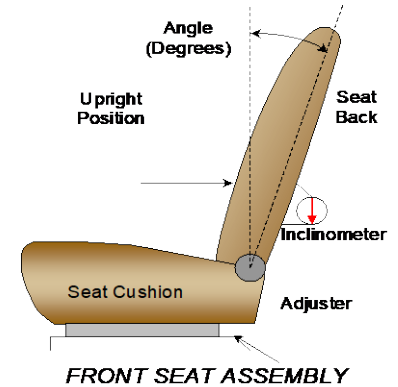
Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
 Test Date: 3/28/2023

NOMINAL DESIGN RIDING POSITION

The driver seat back is positioned as close as possible to the manufacturer's design angle. For the passenger seat back, seat back is adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated May 2018.

	Degrees
Driver Seat Back Angle	5.9° on outboard headrest post
Passenger Seat Back Angle	4.8° on outboard headrest post



SEAT FORE/AFT POSITIONS

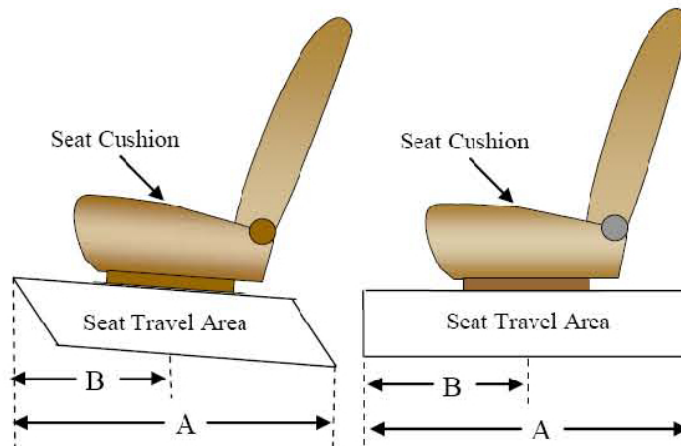
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated May 2018.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	296 mm	148 mm
Passenger Seat	260 mm / 33 detents (1 st as 1)	0 mm / 0 th detent (1 st as 0)

SEAT BELT UPPER ANCHORAGES

The seat belt upper anchorages are set following the manufacturer's specified position as listed in Form 1.

	Total # of Positions	Placed in Position #
Driver Seat	4 (1 st as 1)	0 (1 st as 0)
Passenger Seat	4 (1 st as 1)	0 (1 st as 0)



DATA SHEET NO. 2 (CONTINUED)
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

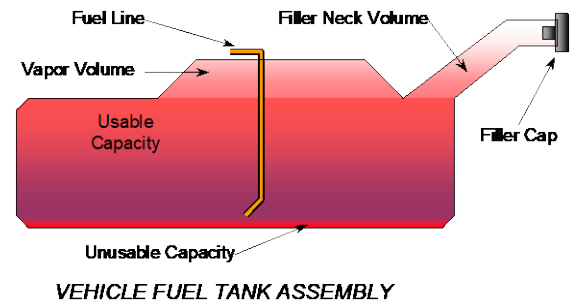
NHTSA No.: M20235400
 Test Date: 3/28/2023

FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	60.2
Usable Capacity of "Optional Tank"	
92-94% of Usable Capacity	55.4 to 56.6
Actual Amount of Solvent used	56.0
1/3 of Usable Capacity	20.1

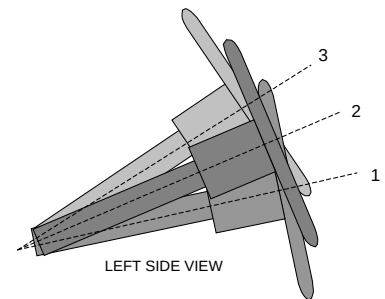
FUEL PUMP

The vehicle is equipped with an electronic fuel pump. The fuel pump operates during engine running and cranking. The filler neck is located on the driver's side.



STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. An aluminum plate is placed across the rim of the steering wheel, an inclinometer is placed on the plate and the angle is measured.



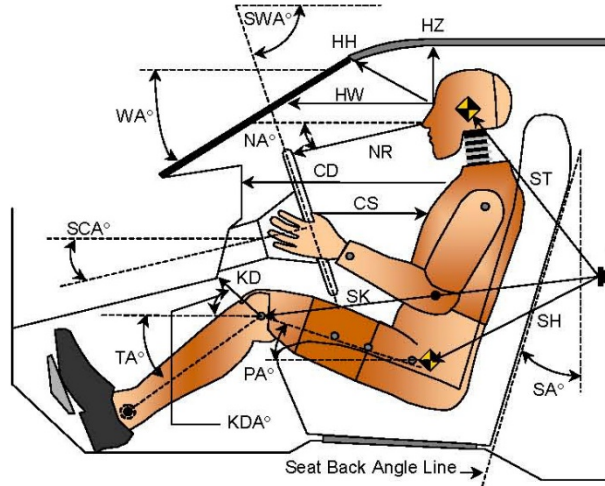
STEERING COLUMN POSITION

	Degrees	Fore/Aft Position (mm)
Lowermost Position 1	68.6	
Geometric Center Position 2	66.1	
Uppermost Position 3	63.6	
Telescoping Steering Wheel Travel		69
Test Position	66.1	35

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
Test Date: 3/28/2023



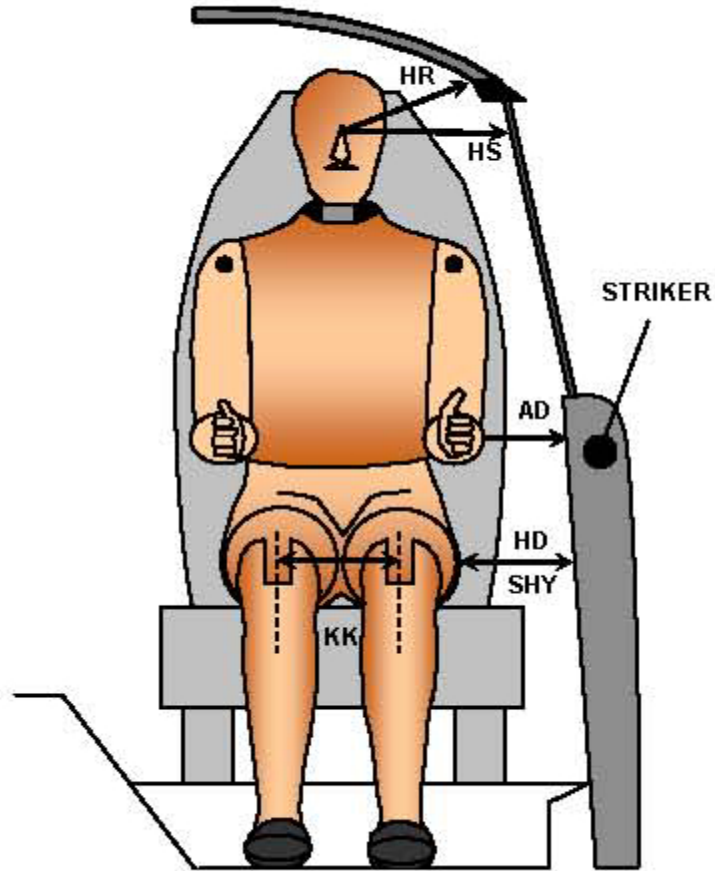
LEFT SIDE VIEW

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		25.0		
SWA°	Steering Wheel Angle		66.1		
SCA°	Steering Column Angle		23.9		
SA°	Seat Back Angle		5.9		4.8
HZ	Head to Roof (Z)	0	90	202	90
HH	Head to Header	321	27.1	262	51.0
HW	Head to Windshield	630	0	613	0
NR	Nose to Rim	392	15.0		
CD	Chest to Dash	536		358	
CS	Chest to Steering Hub	302	5.6		
RA	Rim to Abdomen	190	0		
KDL	Left Knee to Dash	172	31.3	111	39.1
KDR	Right Knee to Dash	174	31.0	114	37.4
PA°	Pelvic Angle		22.1		20.1
TA°	Tibia Angle		50.9		51.8
SK	Striker to Knee	570	2.9	689	100.2
ST	Striker to Head	471	78.1	468	27.3
SH	Striker to H-Point	290	40.2	420	116.3

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
 Test Date: 3/28/2023



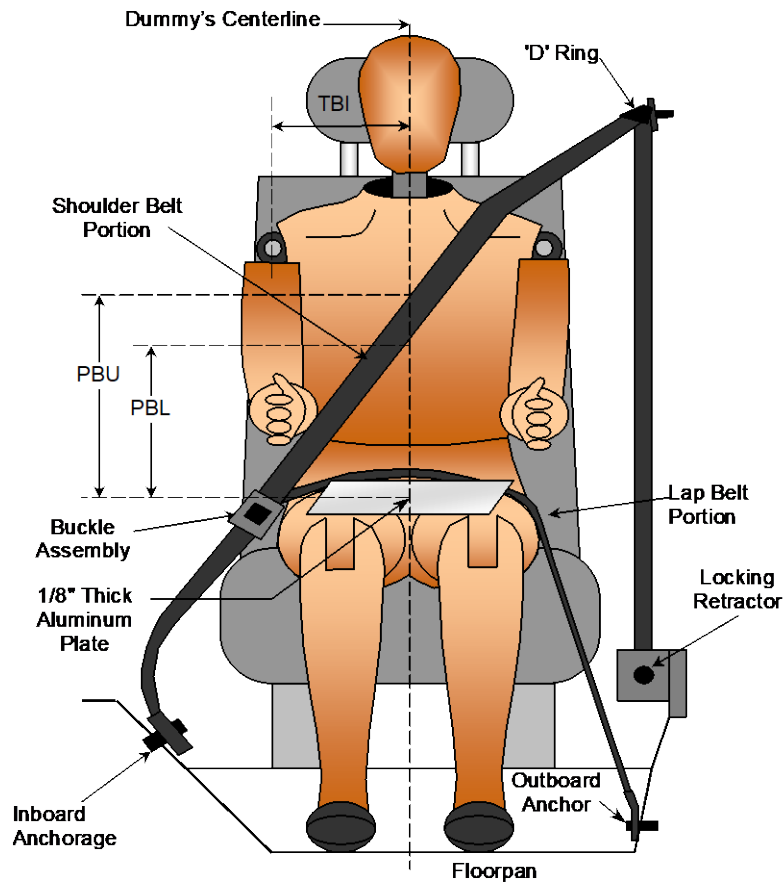
FRONT VIEW OF DUMMY

Code	Measurement Description	Driver	Passenger
		Length (mm)	
AD	Arm to Door	105	73
HD	H-Point to Door	141	238
HR	Head to Side Header	230	258
HS	Head to Side Window	340	378
KK	Knee to Knee	360	229
SHY	Striker to H-Point (Y Direction)	280	279
AA	Ankle to Ankle	350	170

DATA SHEET NO. 5
SEAT BELT POSITIONING DATA

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
Test Date: 3/28/2023



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	365	320
PBL - Top surface of reference to belt lower edge	mm	290	230

BELT LENGTH DATA

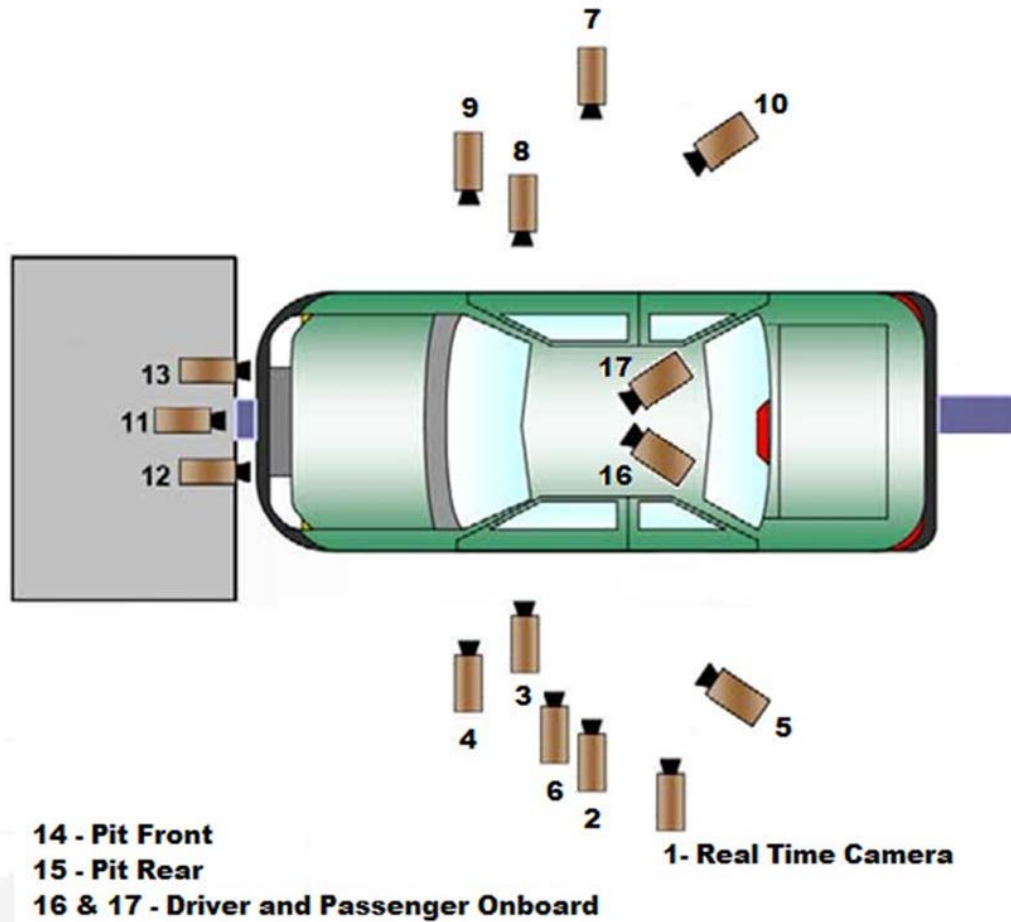
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	895	980
Lap Belt Length as measured on ATD	mm	578	565
Remainder of belt on reel	mm	827	955
Total Belt Length for Continuous Webbing Systems	mm	2720	2920

DATA SHEET NO. 6
HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
Test Date: 3/28/2023

CAMERA POSITIONS FOR FRONTAL IMPACTS



***Camera locations are approximate and not to scale*

DATA SHEET NO. 6 (CONTINUED)
HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
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NHTSA No.: M20235400
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CAMERA LOCATIONS

No.	Camera View	Coordinates* (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall					30
2	Left Overall	-2270	-5910	-1350	12	1000
3	Driver Close-Up	-1840	-6840	-1860	50	1000
4	Left Front Half	-1330	-5870	-1300	24	1000
5	Left Angle	-7290	-5780	-2060	75	1000
6	Steering Column	-1110	-6140	-1240	50	1000
7	Right Overall	-1960	6060	-1490	12	1000
8	Passenger Close-Up	-1620	7060	-1900	50	1000
9	Right Front Half	-1090	5610	-1480	24	1000
10	Right Angle	-7390	5510	-2100	75	1000
11	Windshield	120	0	-2310	12	1000
12	Driver Windshield	200	-370	-2230	25	1000
13	Passenger Windshield	200	370	-2230	25	1000
14	Pit Front	-1110	0	3340	24	1000
15	Pit Rear	-3130	0	3340	24	1000
16	Driver Onboard				12	1000
17	Passenger Onboard				12	1000
18	Real-Time Pan View					30

*COORDINATES:

+X = forward of impact plane

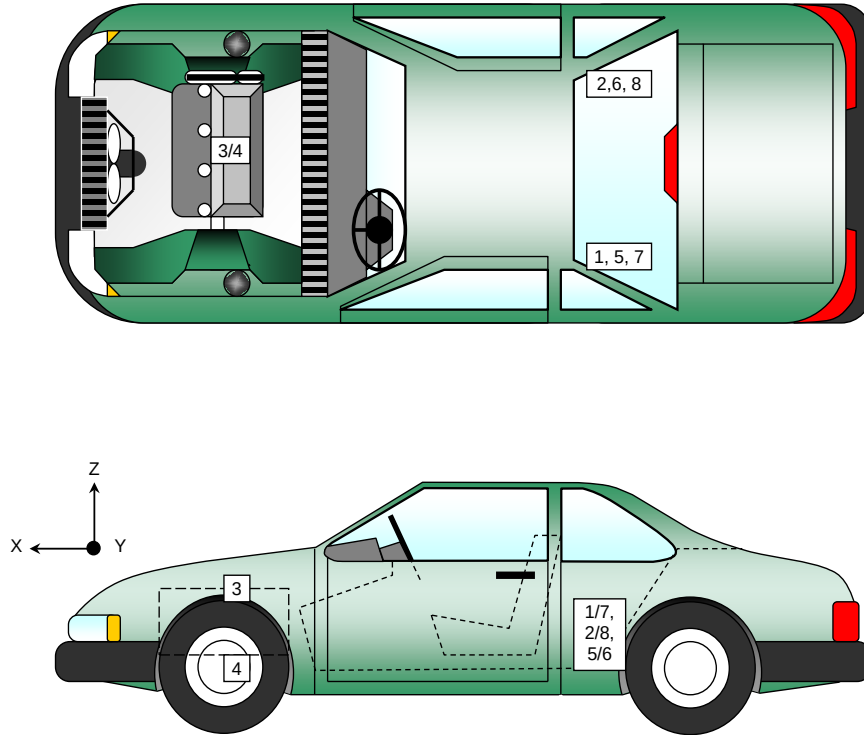
+Y = right of monorail centerline

+Z = below ground level

DATA SHEET NO. 7 **VEHICLE ACCELEROMETER LOCATIONS**

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
Test Date: 3/28/2023



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Crossmember Accelerometer – X Direction	1913	-425	-303
2	Right Rear Crossmember Accelerometer – X Direction	1913	425	-303
3	Engine Top X	3818	0	-964
4	Engine Bottom X	1620	-5	-260
5	Left Rear Crossmember Accelerometer – Z Direction	1913	-425	-303
6	Right Rear Crossmember Accelerometer – Z Direction	1913	425	-303
7	Left Rear Crossmember Accelerometer Redundant – X Direction	1933	-360	-297
8	Right Rear Crossmember Accelerometer Redundant – X Direction	1933	360	-297

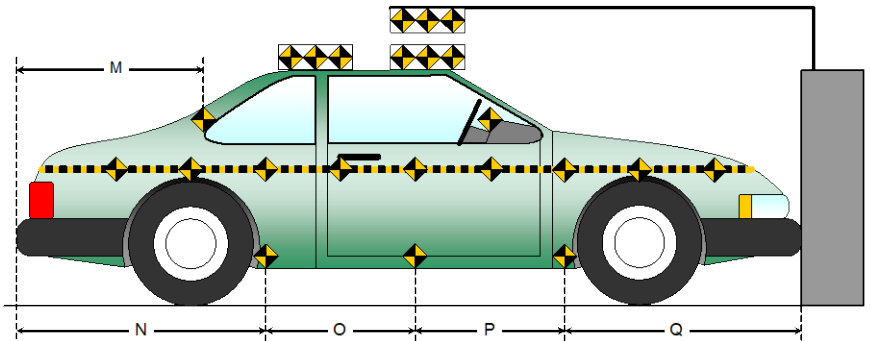
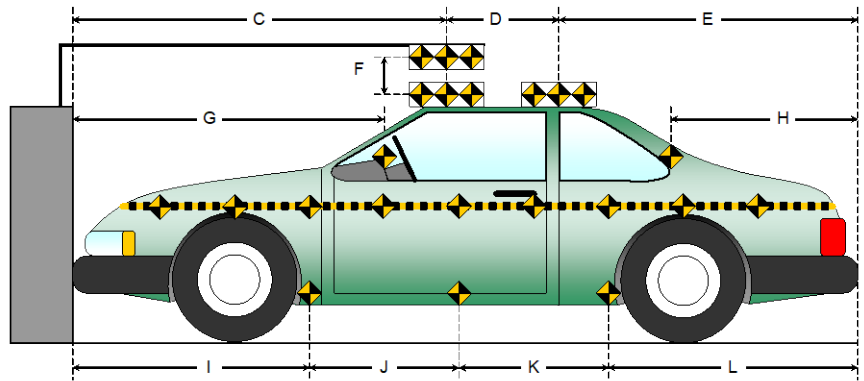
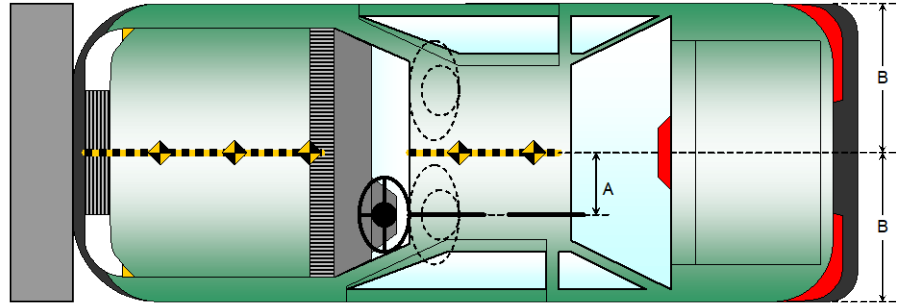
Reference Points: X - Rear Surface of Vehicle (+ forward)
Y - Vehicle Centerline (+ to right)
Z - Ground Plane (+ down)

DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
 Test Date: 3/28/2023

Item	Value (mm)
A	370
B	968
C	2435
D	610
E	1672
F	170
G	
H	772
I	1528
J	828
K	828
L	1533
M	772
N	1533
O	828
P	828
Q	1528



DATA SHEET NO. 9
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
Test Date: 3/28/2023

ADVANCED RESEARCH LOAD CELL BARRIER

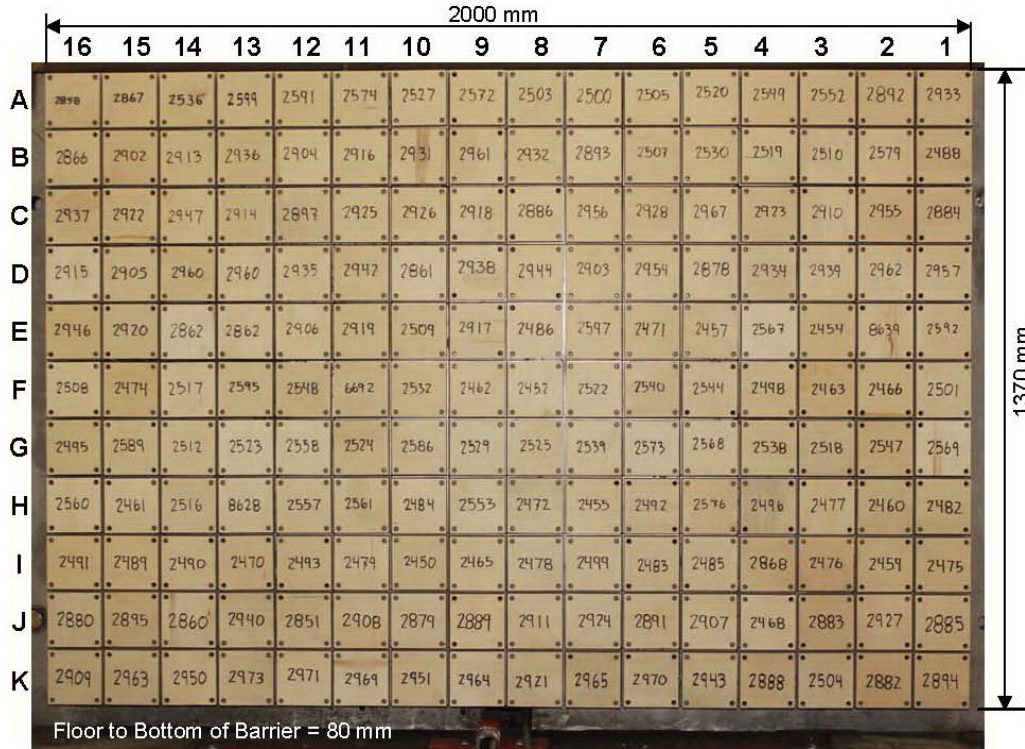


Photo for Reference Only

Centerline

A-16	A-15	A-14	A-13	A-12	A-11	A-10	A-09	A-08	A-07	A-06	A-05	A-04	A-03	A-02	A-01
B-16	B-15	B-14	B-13	B-12	B-11	B-10	B-09	B-08	B-07	B-06	B-05	B-04	B-03	B-02	B-01
C-16	C-15	C-14	C-13	C-12	C-11	C-10	C-09	C-08	C-07	C-06	C-05	C-04	C-03	C-02	C-01
D-16	D-15	D-14	D-13	D-12	D-11	D-10	D-09	D-08	D-07	D-06	D-05	D-04	D-03	D-02	D-01
E-16	E-15	E-14	E-13	E-12	E-11	E-10	E-09	E-08	E-07	E-06	E-05	E-04	E-03	E-02	E-01
F-16	F-15	F-14	F-13	F-12	F-11	F-10	F-09	F-08	F-07	F-06	F-05	F-04	F-03	F-02	F-01
G-16	G-15	G-14	G-13	G-12	G-11	G-10	G-09	G-08	G-07	G-06	G-05	G-04	G-03	G-02	G-01
H-16	H-15	H-14	H-13	H-12	H-11	H-10	H-09	H-08	H-07	H-06	H-05	H-04	H-03	H-02	H-01
I-16	I-15	I-14	I-13	I-12	I-11	I-10	I-09	I-08	I-07	I-06	I-05	I-04	I-03	I-02	I-01
J-16	J-15	J-14	J-13	J-12	J-11	J-10	J-09	J-08	J-07	J-06	J-05	J-04	J-03	J-02	J-01
K-16	K-15	K-14	K-13	K-12	K-11	K-10	K-09	K-08	K-07	K-06	K-05	K-04	K-03	K-02	K-01

Load Cells are 121 mm x 121 mm with a 7 mm gap in between each load cell.

DATA SHEET NO. 10
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
Test Date: 3/28/2023

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Data Channels	49
Passenger Dummy Data Channels	49
Vehicle Structure Accelerometers	8
Barrier Channels	528
Total	634

CAMERA COVERAGE

Type of Camera	Number Used in this Test
High-Speed Vehicle Onboard	2
High-Speed Offboard	14
Real-Time	2
Total	18

DATA SHEET NO. 11
POST-TEST OBSERVATIONS

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
Test Date: 3/28/2023

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	HIII 50% / 351	HIII 5% / 142
Head Contact	Frontal Airbag, Headrest	Frontal Airbag, Headrest
Upper Torso Contact	Frontal Airbag	Frontal Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Airbag	Knee Airbag
Right Knee Contact	Knee Airbag	Knee Airbag

DOOR OPENING, TRUNK OPENING, AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked/Unlocked Doors	Doors were unlocked	Doors were unlocked
Front Door Opening	Remained closed and unlocked; opened without tools	Remained closed and unlocked; opened without tools
Rear Door Opening	Remained closed and unlocked; opened without tools	Remained closed and unlocked; opened without tools
Trunk/Hatch/Tailgate Opening	Remained closed; opened without tools	
Seat Track Shift (mm)	0	0
Seat Back Movement	None	None

OTHER VEHICLE POST-TEST OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Windshield Damage	None
Window Damage	None
Other Notable Effects	None

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	3260
Center	mm	3140
Right Side	mm	3130
Average	mm	3177

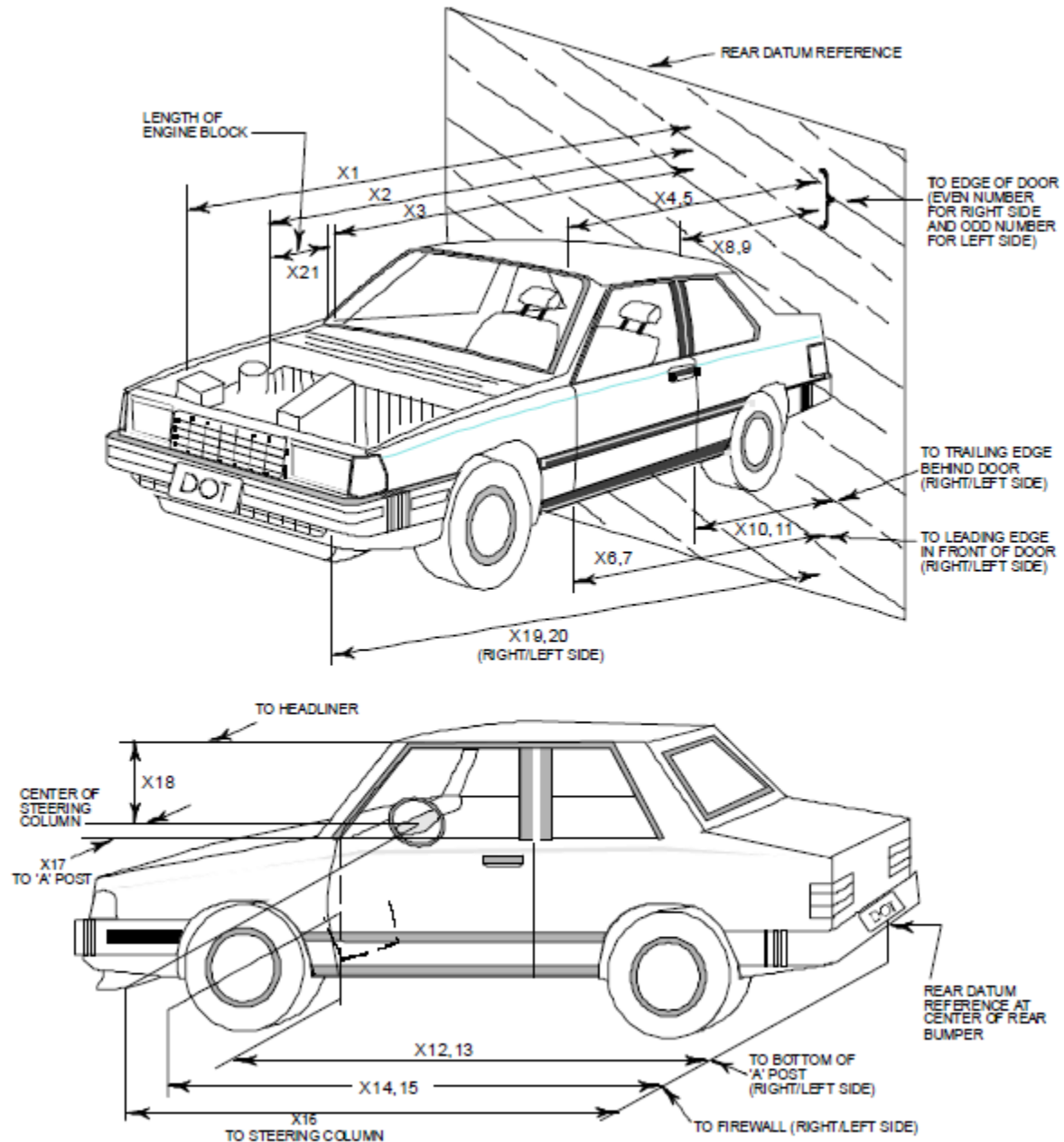
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Driver		Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	Yes	Yes	Yes
Curtain Side Airbag	Yes	No	Yes	No
Torso/Pelvis Side Airbag	Yes	No	Yes	No
Knee Airbag	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes		Yes	
Other				

DATA SHEET NO. 12 **VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
 Test Date: 3/28/2023



DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
Test Date: 3/28/2023

No.	Measurement Description	Pre-Test	Post-Test	Change
1	Total Length of Vehicle at Centerline	4717	4188	-529
2	RSOV to Front of Engine	3987	3724	-263
3	RSOV to Firewall	3623	3620	-3
4	RSOV to Upper Leading Edge of Right Door	3174	3171	-3
5	RSOV to Upper Leading Edge of Left Door	3174	3172	-2
6	RSOV to Lower Leading Edge of Right Door	3216	3213	-3
7	RSOV to Lower Leading Edge of Left Door	3216	3214	-2
8	RSOV to Upper Trailing Edge of Right Door	2115	2112	-3
9	RSOV to Upper Trailing Edge of Left Door	2115	2111	-4
10	RSOV to Lower Trailing Edge of Right Door	2191	2190	-1
11	RSOV to Lower Trailing Edge of Left Door	2191	2185	-6
12	RSOV to Bottom of "A" Post of Right Side	3258	3255	-3
13	RSOV to Bottom of "A" Post of Left Side	3258	3253	-5
14	RSOV to Firewall, Right Side	3512	3500	-12
15	RSOV to Firewall, Left Side	3512	3499	-13
16	RSOV to Steering Column	2732	2788	56
17	Center of Steering Column to "A" Post	351	344	-7
18	Center of Steering Column to Headliner	430	460	30
19	RSOV to Right Side of Front Bumper	4500	4105	-395
20	RSOV to Left Side of Front Bumper	4500	4085	-415
21	Length of Engine Block	445	445	0
RD	RSOV to Right Side of Dash Panel	2920	2915	-5
CD	RSOV to Center of Dash Panel	2944	2920	-24
LD	RSOV to Left Side of Dash Panel	2934	2928	-6

All dimensions in mm

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
Test Date: 3/28/2023

VEHICLE INFORMATION

VIN: 7MMVABCM5PN125585
Vehicle Size Category: MPV

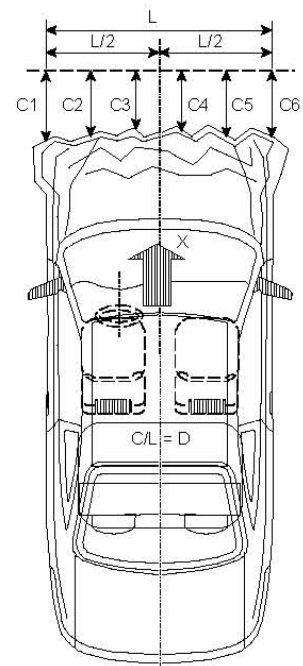
Wheelbase (mm): 2815
Test Weight (kg): 1842.0

ACCELEROMETER DATA

Accelerometer Locations: As per Data Sheet No. 7
Cal. Procedure/Interval: MGA Procedure / 6 month
Integration Algorithm: Trapezoidal
Linearity: > 99%
Impact Velocity (km/h): 56.23
Velocity Change (km/h): 74.0
Time of Separation (msec) 99

CRUSH PROFILE

Collision Deformation Classification: 12FDEW3
Midpoint of Damage: Centerline
Damage Region Length (mm): 1468
Impact Mode: Frontal



No.	Measurement Description	Units	Pre-Test	Post-Test	Exterior Crush
C1	Crush zone 1 at left side	mm	4500	4085	415
C2	Crush zone 2 at left side	mm	4626	4117	509
C3	Crush zone 3 at left side	mm	4668	4165	503
C4	Crush zone 4 at right side	mm	4668	4157	511
C5	Crush zone 5 at right side	mm	4626	4135	491
C6	Crush zone 6 at right side	mm	4500	4105	395
L	C1 TO C6	mm	1468	1462	6

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

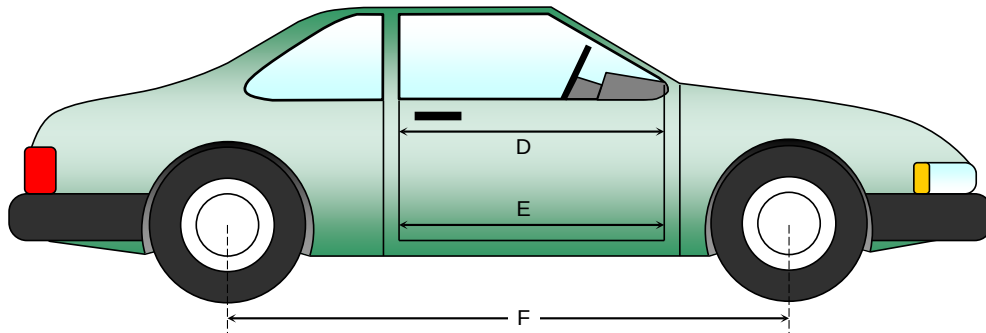
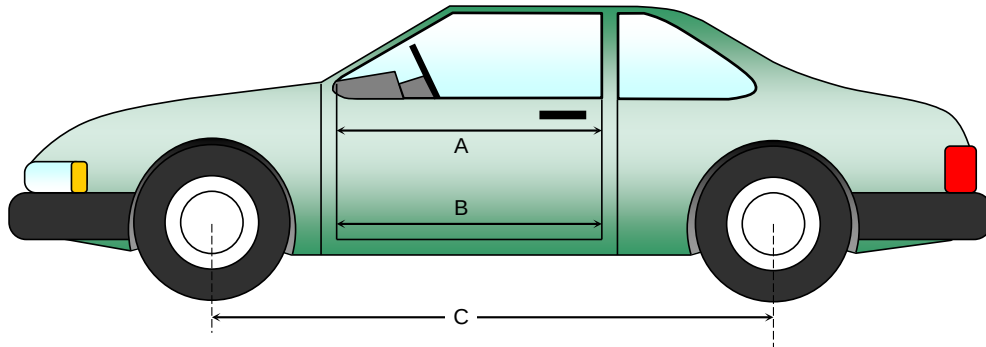
NHTSA No.: M20235400
Test Date: 3/28/2023

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Change
A	Left Side Upper	mm	994	992	-2
B	Left Side Lower	mm	860	857	-3
D	Right Side Upper	mm	993	990	-3
E	Right Side Lower	mm	874	875	1

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Change
C	Left Side Wheelbase	mm	2815	2720	-95
F	Right Side Wheelbase	mm	2815	2753	-62



DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

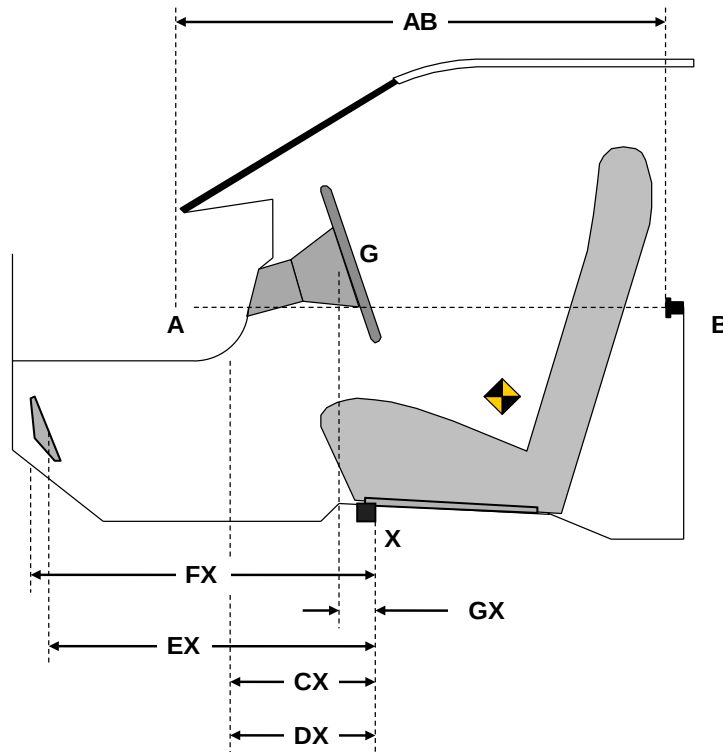
Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
 Test Date: 3/28/2023

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Change
AB	Door Opening (Inside Window Jam)	mm	775	775	0
CX	Left Knee Bolster to X	mm	316	315	-1
DX	Right Knee Bolster to X	mm	322	325	3
EX	Brake Pedal to X	mm	545	550	5
FX	Foot Rest to X	mm	602	600	-2
GX	Center of Steering Column Wheel Hub to X	mm	49	115	66

X = Front of Seat Track (stationary)



DRIVER COMPARTMENT

DATA SHEET NO. 15
SUMMARY OF FMVSS 212 AND FMVSS 219 (PARTIAL) DATA

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
 Test Date: 3/28/2023

WINDSHIELD MOUNTING DETAILS

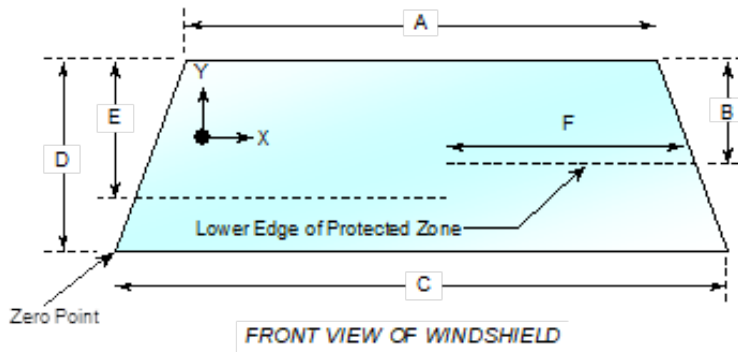
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

The standard requires that the post-test retention measurement be a minimum of 75 percent of the pre-test total periphery measurement for vehicles not equipped with occupant passive restraints and 50 percent for each side of the windshield for vehicles which are equipped with occupant passive restraints.

Temperature of windshield molding during test: 20.7°C.

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2205	2205	100
Right Side	2205	2205	100
Total	4410	4410	100



Item	Units	Value
A	mm	1234
B	mm	390
C	mm	1472
D	mm	852
E	mm	465
F	mm	541

AREA OF PROTECTED ZONE FAILURES

A. Provide coordinates of the area that the protected zone was penetrated more than 0.25 inches by a vehicle component other than one that is normally in contact with the windshield. **None**

X	Y

B. Provide coordinates of the area beneath the protected zone that the inner surface of the windshield was penetrated by a vehicle component. **None**

X	Y

DATA SHEET NO. 16
FMVSS 301 BARRIER IMPACT AND STATIC ROLLOVER

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
 Test Date: 3/28/2023

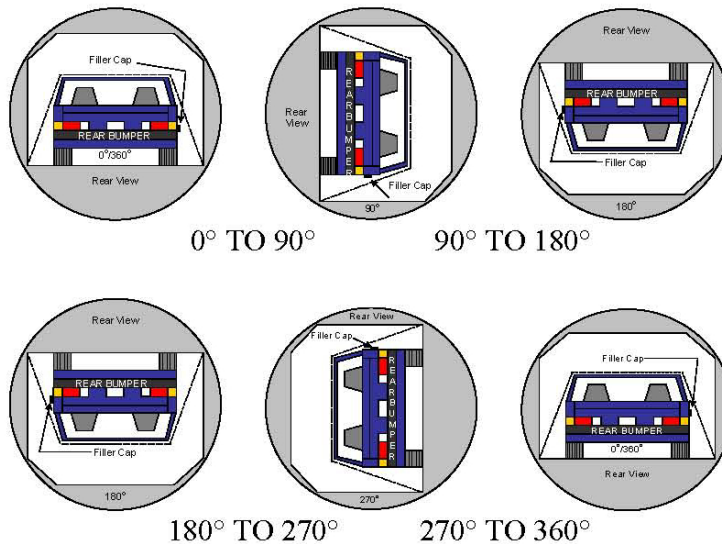
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 20.7°C

Test Time: 10:59 a.m.

- A. From impact until vehicle motion ceases: (Maximum Allowable = 1 ounce) 0.0 oz.
 B. For the 5 minute period after motion ceases: (Maximum Allowable = 5 ounces) 0.0 oz.
 C. For the following 25 minutes: (Maximum Allowable = 1 ounce / minute) None
 D. Spillage Details: None

FMVSS 301 STATIC ROLLOVER RESULTS



1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard Solvent spillage: **None**

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	111	300	411
90° to 180°	112	300	412
180° to 270°	107	300	407
270° to 360°	111	300	411

DATA SHEET NO. 16 (CONTINUED)
FMVSS 301 BARRIER IMPACT AND STATIC ROLLOVER

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
 Test Date: 3/28/2023

FMVSS 301 SPILLAGE TABLE (UNITS IN OUNCES)

Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eight Minute
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

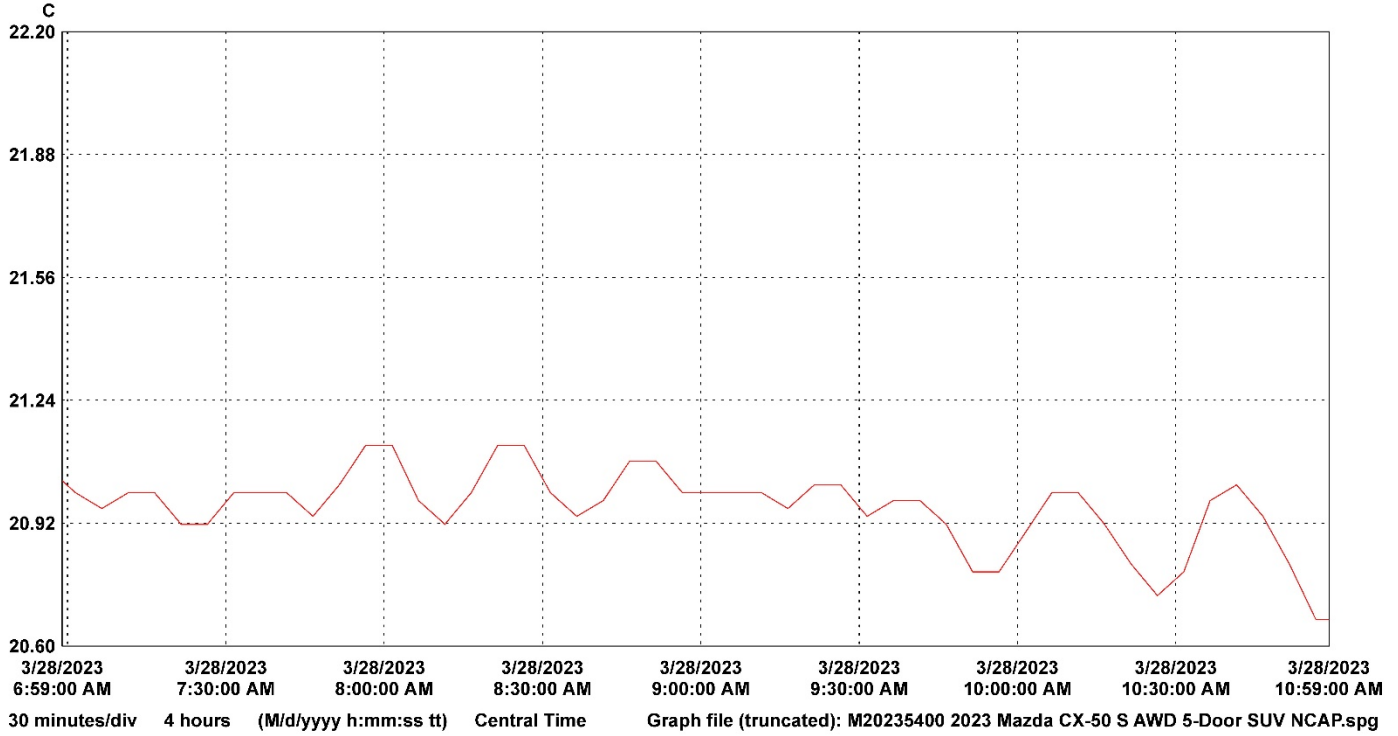
SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° to 90°	
90° to 180°	
180° to 270°	
270° to 360°	

DATA SHEET NO. 17
DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

Test Vehicle: 2023 Mazda CX-50 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20235400
 Test Date: 3/28/2023



LN	Serial #	Description	CH	Value	Maximum	Average	Minimum	Units	CH description	Logger file
1	18352040	VSC_Prep_Room 1	1		21.12	20.96	20.67	C	Temperature	18352040_VSC_Prep_Room.spl

**APPENDIX A
PHOTOGRAPHS**

TABLE OF PHOTOGRAPHS

		<u>Page No.</u>
Photo No. 001	Load Cell Location	A-1
Photo No. 002	Pre-Test Load Cell Wall	A-1
Photo No. 003	Post-Test Load Cell Wall	A-2
Photo No. 004	Manufacturer's Label	A-2
Photo No. 005	Tire Placard	A-3
Photo No. 006	2023 Mazda CX-50 AWD 5-Door SUV Frontal As Delivered	A-3
Photo No. 007	Left Rear 3-4 View, As Received	A-4
Photo No. 008	Pre-Test Front View of Test Vehicle	A-4
Photo No. 009	Post-Test Front View of Test Vehicle	A-5
Photo No. 010	Pre-Test Left View of Test Vehicle	A-5
Photo No. 011	Post-Test Left View of Test Vehicle	A-6
Photo No. 012	Pre-Test Right View of Test Vehicle	A-6
Photo No. 013	Post-Test Right View of Test Vehicle	A-7
Photo No. 014	Pre-Test Right Front 3-4 View	A-7
Photo No. 015	Post-Test Right Front 3-4 View	A-8
Photo No. 016	Pre-Test Left Rear 3-4 View	A-8
Photo No. 017	Post-Test Left Rear 3-4 View	A-9
Photo No. 018	Pre-Test Windshield View	A-9
Photo No. 019	Post-Test Windshield View	A-10
Photo No. 020	Pre-Test Engine Compartment View	A-10
Photo No. 021	Post-Test Engine Compartment View	A-11
Photo No. 022	Pre-Test Fuel Filler Cap View	A-11
Photo No. 023	Post-Test Fuel Filler Cap View	A-12
Photo No. 024	Pre-Test Front Underbody View	A-12
Photo No. 025	Post-Test Front Underbody View	A-13
Photo No. 026	Pre-Test Rear Underbody View	A-13
Photo No. 027	Post-Test Rear Underbody View	A-14
Photo No. 028	Pre-Test Dummy Cable Routing	A-14
Photo No. 029	Post-Test Dummy Cable Routing	A-15
Photo No. 030	Pre-Test Driver Dummy Front View	A-15

		<u>Page No.</u>
Photo No. 031	Post-Test Driver Dummy Front View	A-16
Photo No. 032	Pre-Test Driver Dummy Window View	A-16
Photo No. 033	Post-Test Driver Dummy Window View	A-17
Photo No. 034	Pre-Test Driver Dummy and Vehicle Interior View	A-17
Photo No. 035	Post-Test Driver Dummy and Vehicle Interior View	A-18
Photo No. 036	Pre-Test Driver's Seat Fore-Aft Markings	A-18
Photo No. 037	Post-Test Driver's Seat Fore-Aft Markings	A-19
Photo No. 038	Pre-Test View of Belt Anchorage for Driver Dummy	A-19
Photo No. 039	Post-Test View of Belt Anchorage for Driver Dummy	A-20
Photo No. 040	Pre-Test View of Belt Buckle and Latch Plate for Driver Dummy	A-20
Photo No. 041	Post-Test View of Belt Buckle and Latch Plate for Driver Dummy	A-21
Photo No. 042	Pre-Test Driver Dummy Feet	A-21
Photo No. 043	Post-Test Driver Dummy Feet	A-22
Photo No. 044	Pre-Test Driver's Side Knee Bolster	A-22
Photo No. 045	Post-Test Driver's Side Knee Bolster	A-23
Photo No. 046	Pre-Test Driver's Side Floorpan	A-23
Photo No. 047	Post-Test Driver's Side Floorpan	A-24
Photo No. 048	Post-Test Driver Dummy Face	A-24
Photo No. 049	Post-Test Driver Dummy Contact with Airbag	A-25
Photo No. 050	Post-Test Driver Dummy Contact with Headrest	A-25
Photo No. 051	Pre-Test View of the Steering Wheel	A-26
Photo No. 052	Post-Test View of the Steering Wheel	A-26
Photo No. 053	Pre-Test Passenger Dummy Front View	A-27
Photo No. 054	Post-Test Passenger Dummy Front View	A-27
Photo No. 055	Pre-Test Passenger Dummy Window View	A-28
Photo No. 056	Post-Test Passenger Dummy Window View	A-28
Photo No. 057	Pre-Test Passenger Dummy and Vehicle Interior	A-29
Photo No. 058	Post-Test Passenger Dummy and Vehicle Interior	A-29
Photo No. 059	Pre-Test Passenger's Seat Fore-Aft Markings	A-30
Photo No. 060	Post-Test Passenger's Seat Fore-Aft Markings	A-30

		<u>Page No.</u>
Photo No. 061	Pre-Test View of Belt Anchorage for Passenger Dummy	A-31
Photo No. 062	Post-Test View of Belt Anchorage for Passenger Dummy	A-31
Photo No. 063	Pre-Test View of Belt Buckle and Latch Plate for Passenger Dummy	A-32
Photo No. 064	Post-Test View of Belt Buckle and Latch Plate for Passenger Dummy	A-32
Photo No. 065	Pre-Test Passenger Dummy Feet	A-33
Photo No. 066	Post-Test Passenger Dummy Feet	A-33
Photo No. 067	Pre-Test Passenger's Side Knee Bolster	A-34
Photo No. 068	Post-Test Passenger's Side Knee Bolster	A-34
Photo No. 069	Pre-Test Passenger's Side Floorpan	A-35
Photo No. 070	Post-Test Passenger's Side Floorpan	A-35
Photo No. 071	Post-Test Passenger Dummy Face	A-36
Photo No. 072	Post-Test Passenger Dummy Contact with Airbag	A-36
Photo No. 073	Post-Test Passenger Dummy Contact with Headrest	A-37
Photo No. 074	Photograph of Ballast Installed in Vehicle	A-37
Photo No. 075	Post-Test Stoddard Solvent Spillage Location View	A-38
Photo No. 076	Post-Test Speed Trap Read-Out	A-38
Photo No. 077	Vehicle at 0 Degree on Static Rollover Device	A-39
Photo No. 078	Vehicle at 90 Degrees on Static Rollover Device	A-39
Photo No. 079	Vehicle at 180 Degrees on Static Rollover Device	A-40
Photo No. 080	Vehicle at 270 Degrees on Static Rollover Device	A-40
Photo No. 081	Vehicle at 360 Degrees on Static Rollover Device	A-41
Photo No. 082	2023 Mazda CX-50 AWD 5-Door SUV Frontal Impact Event	A-41
Photo No. 083	Monroney Label Photograph	A-42

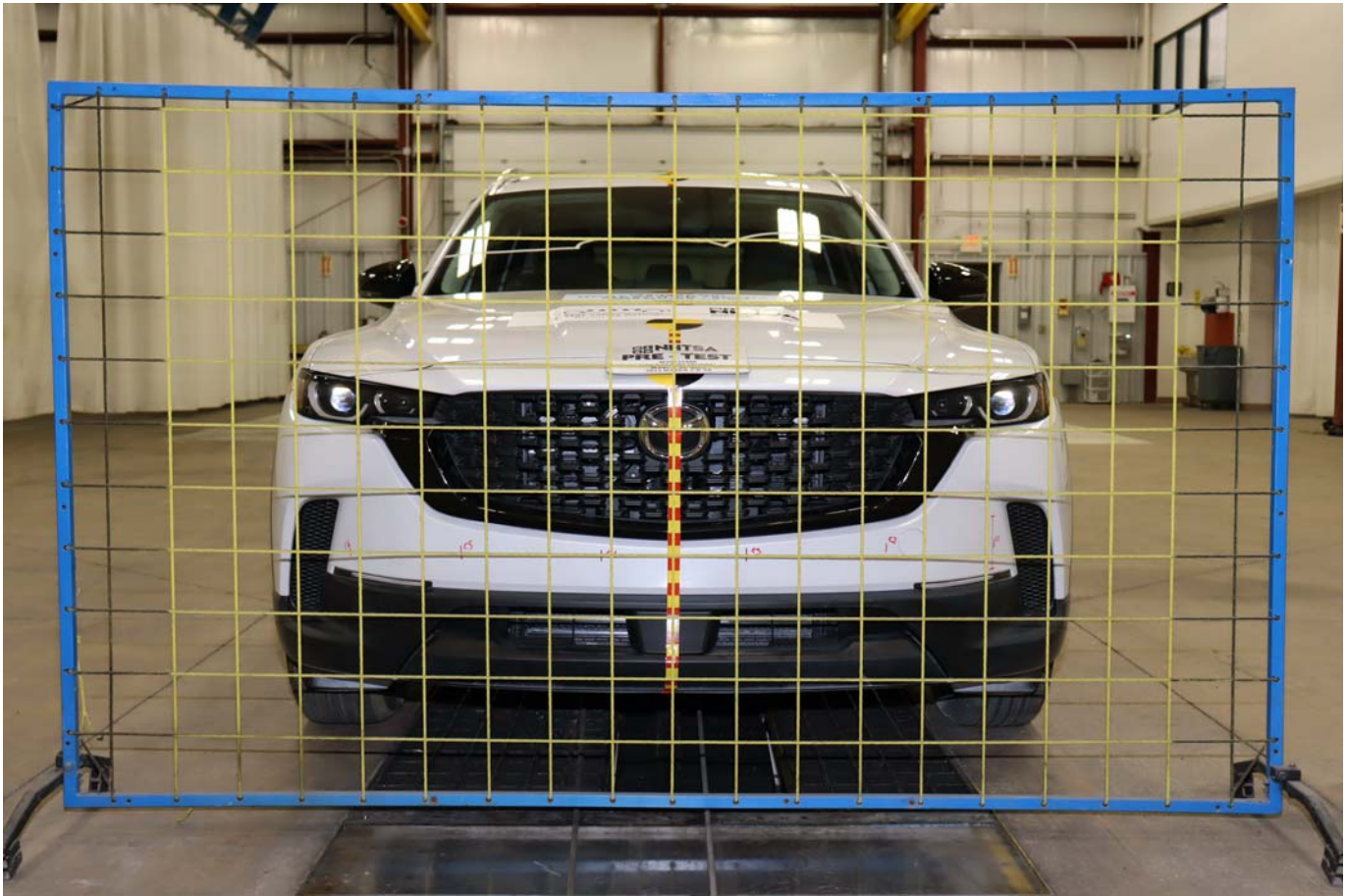


Photo No. 001 - Load Cell Location



Photo No. 002 - Pre-Test Load Cell Wall



Photo No. 003 - Post-Test Load Cell Wall



Photo No. 004 - Manufacturer's Label



Photo No. 005 - Tire Placard



Photo No. 006 - 2023 Mazda CX-50 AWD 5-Door SUV Frontal As Delivered



Photo No. 007 - Left Rear 3-4 View, As Received

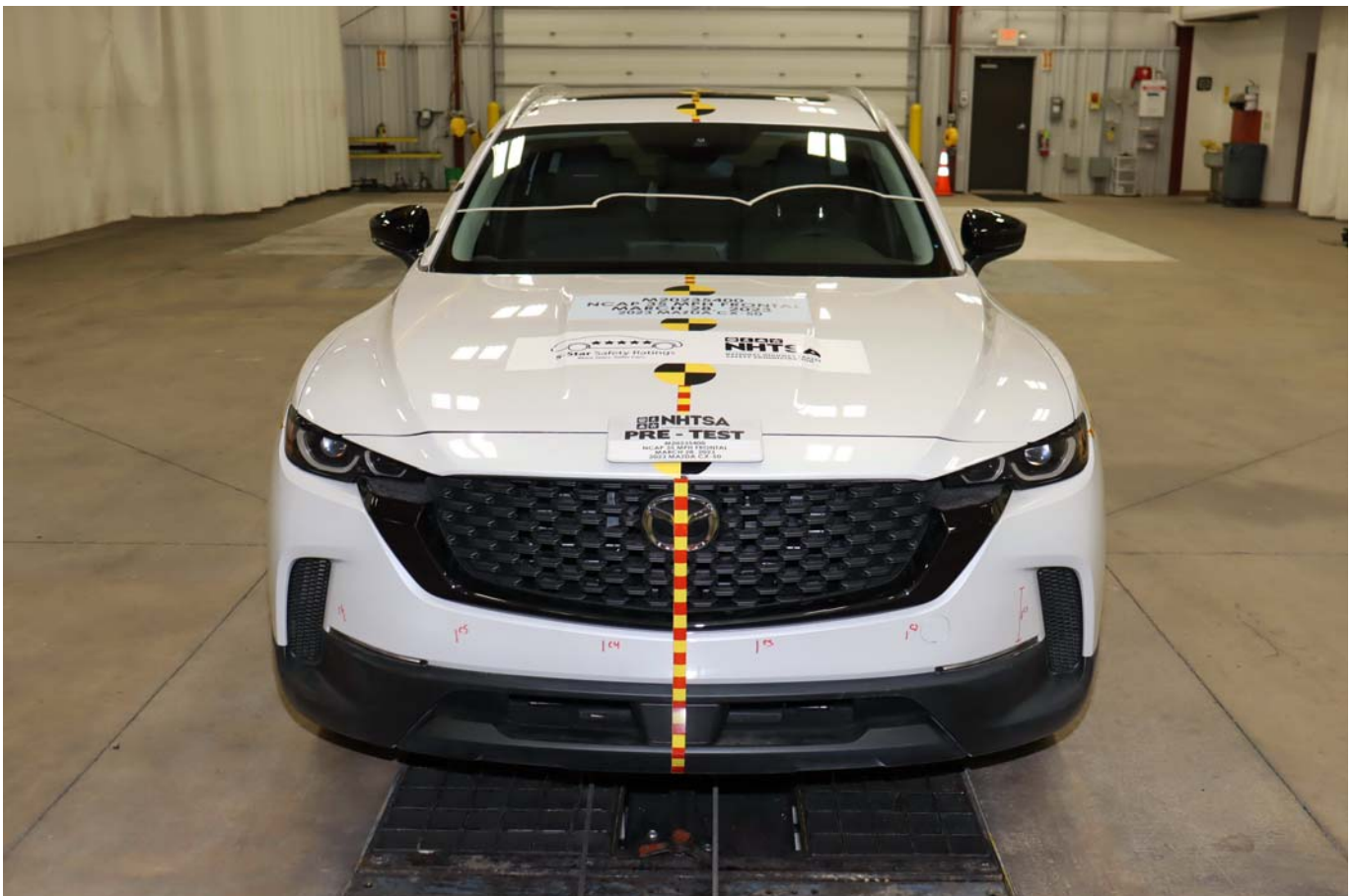


Photo No. 008 - Pre-Test Front View of Test Vehicle

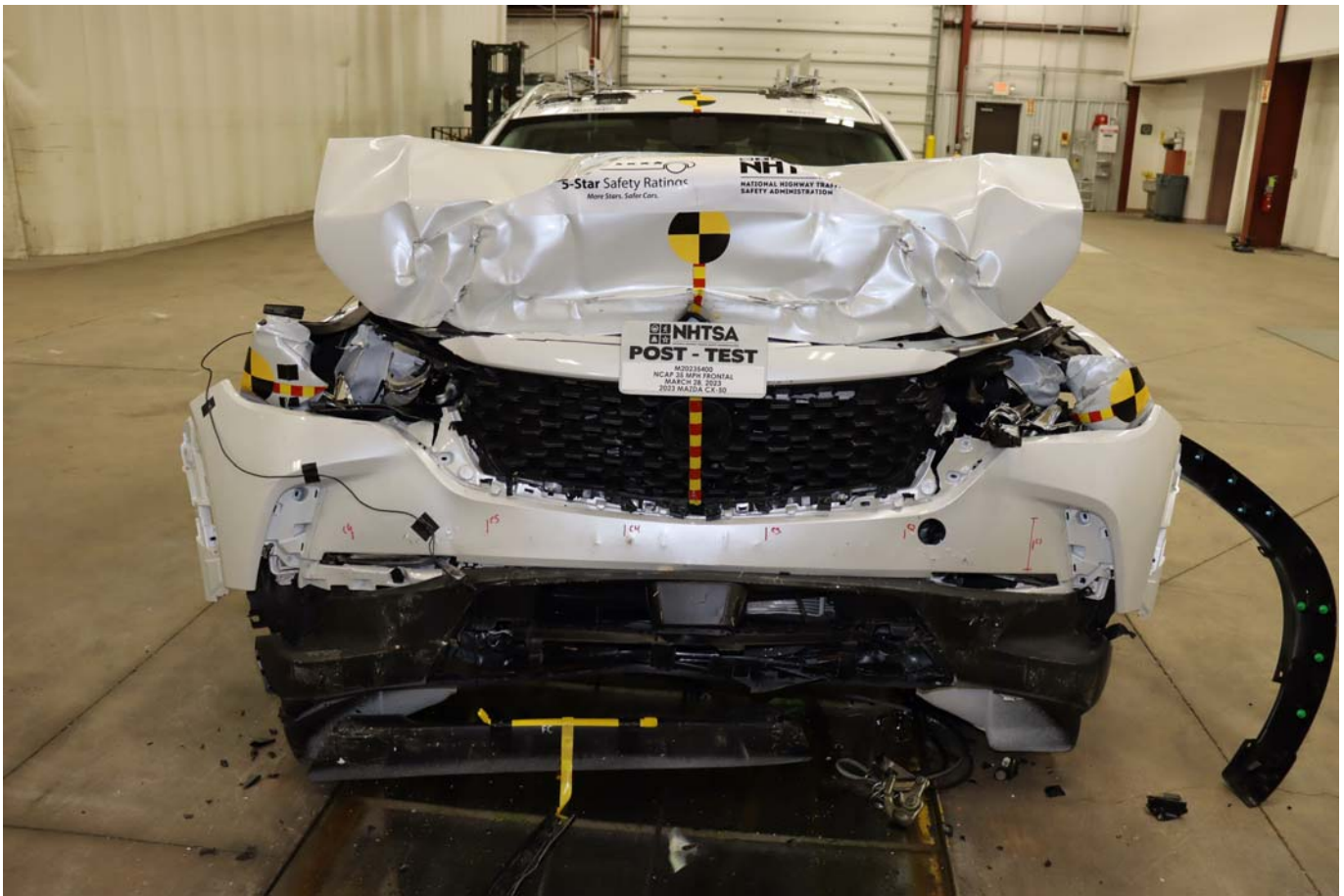


Photo No. 009 - Post-Test Front View of Test Vehicle

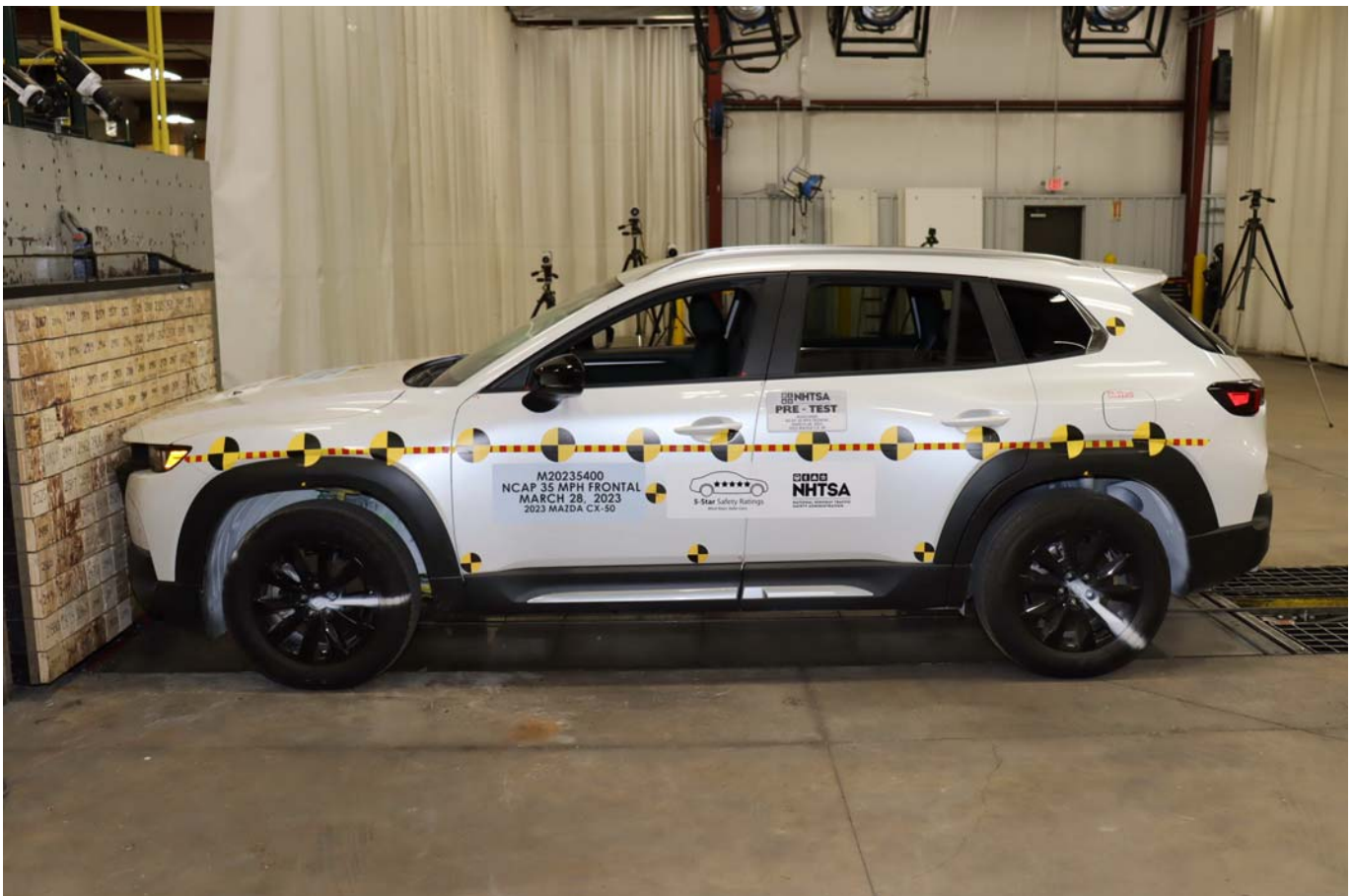


Photo No. 010 - Pre-Test Left View of Test Vehicle



Photo No. 011 - Post-Test Left View of Test Vehicle



Photo No. 012 - Pre-Test Right View of Test Vehicle



Photo No. 013 - Post-Test Right View of Test Vehicle



Photo No. 014 - Pre-Test Right Front 3-4 View

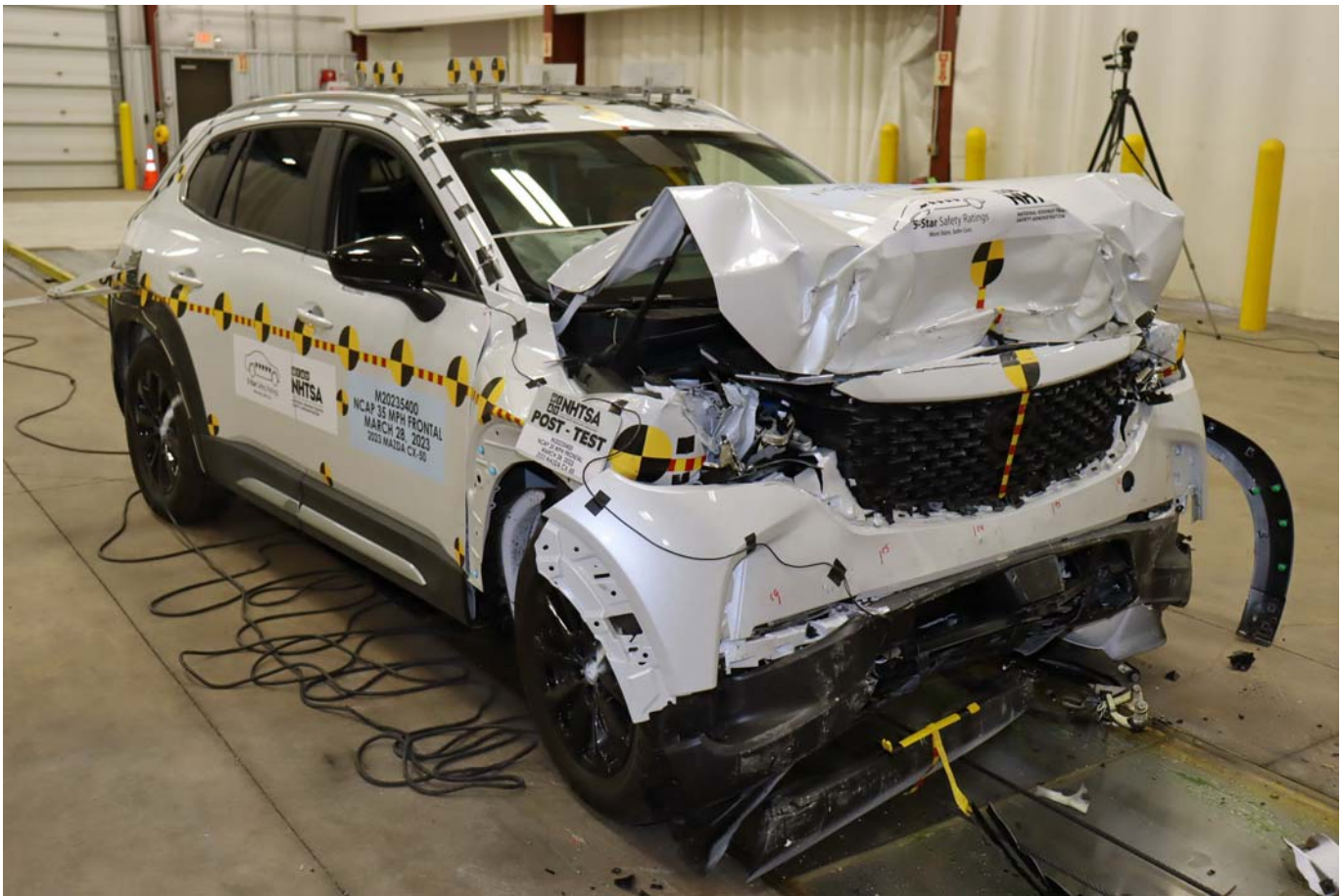


Photo No. 015 - Post-Test Right Front 3-4 View



Photo No. 016 - Pre-Test Left Rear 3-4 View



Photo No. 017 - Post-Test Left Rear 3-4 View



Photo No. 018 - Pre-Test Windshield View

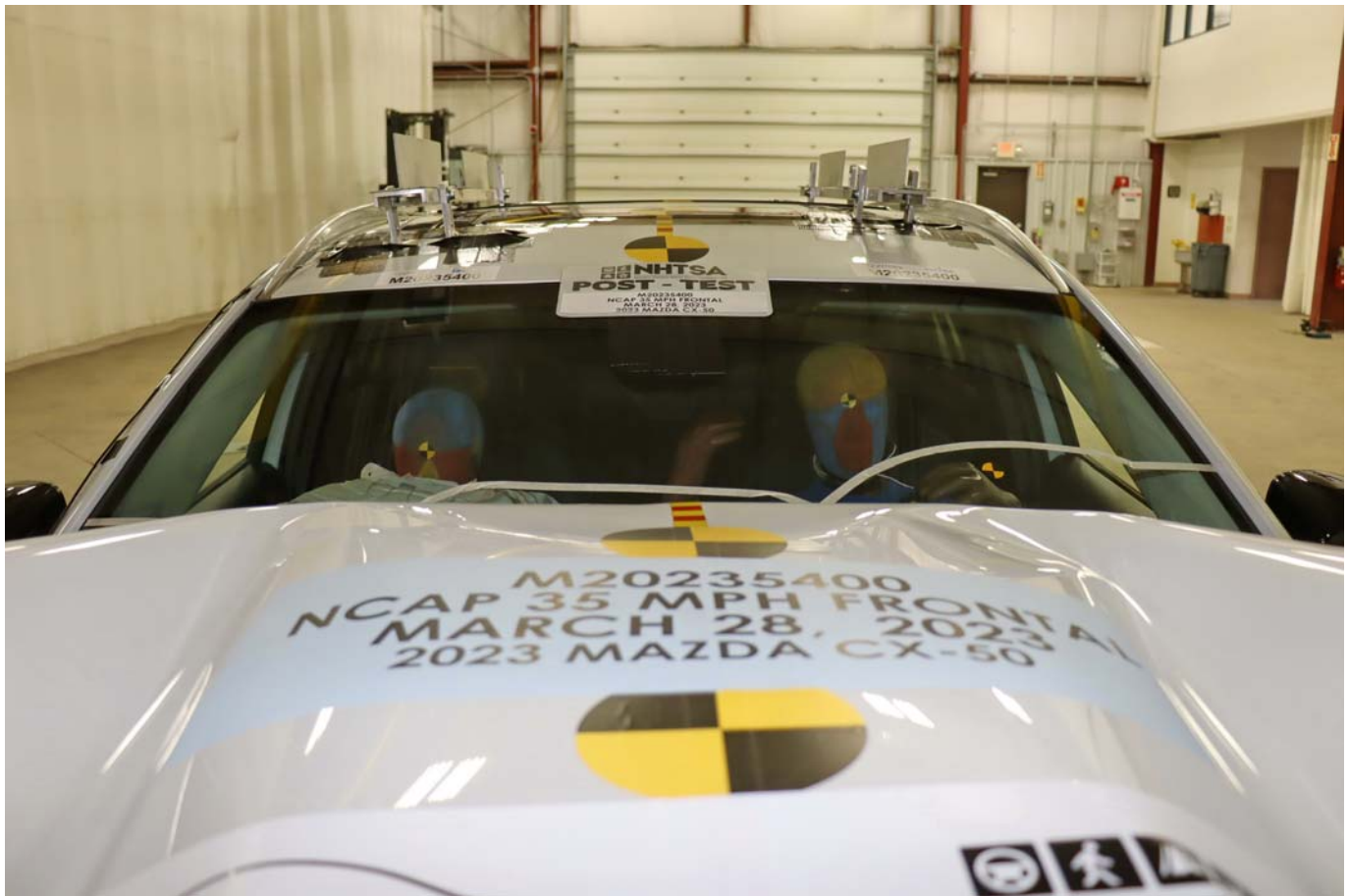


Photo No. 019 - Post-Test Windshield View

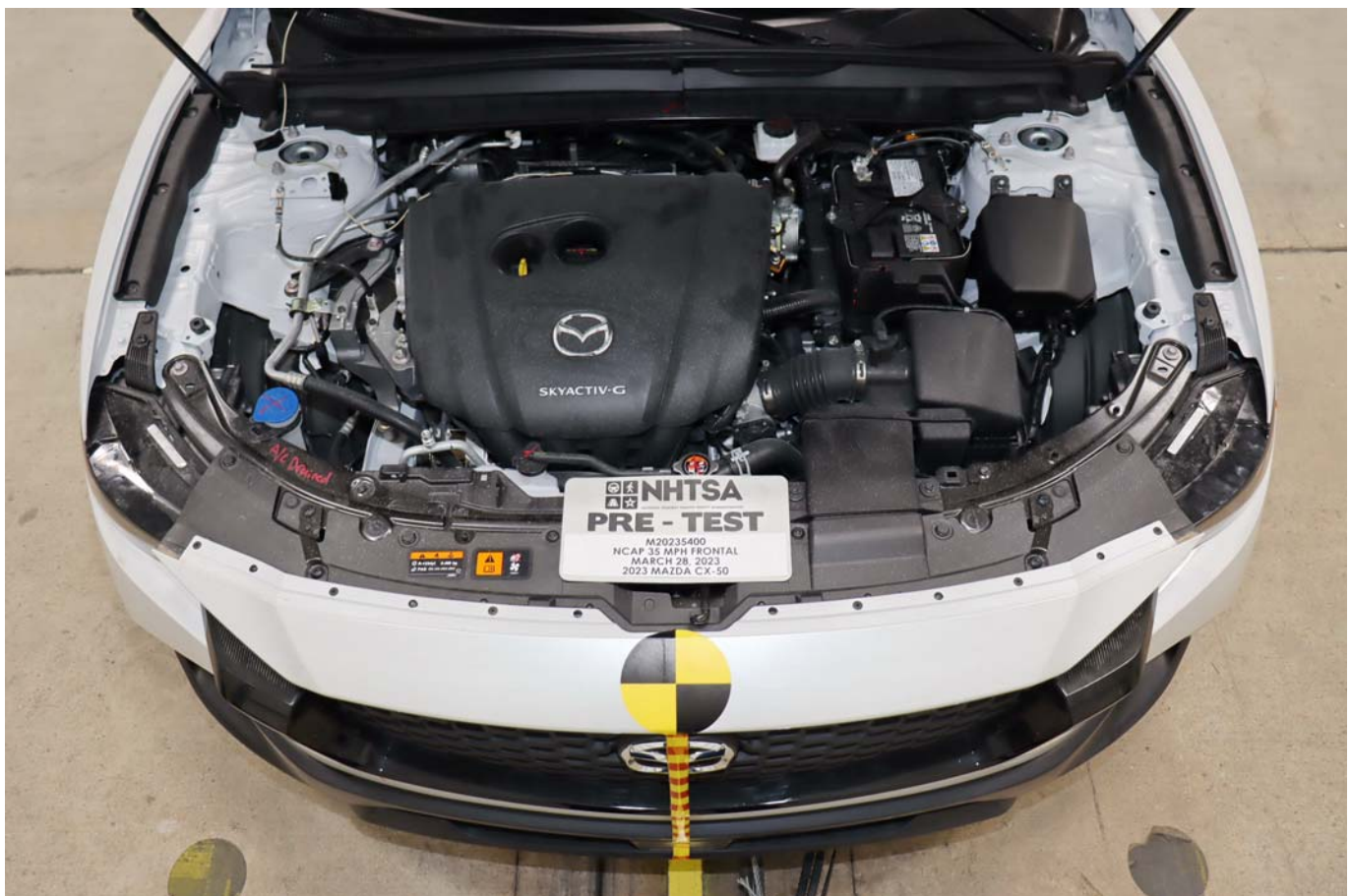


Photo No. 020 - Pre-Test Engine Compartment View

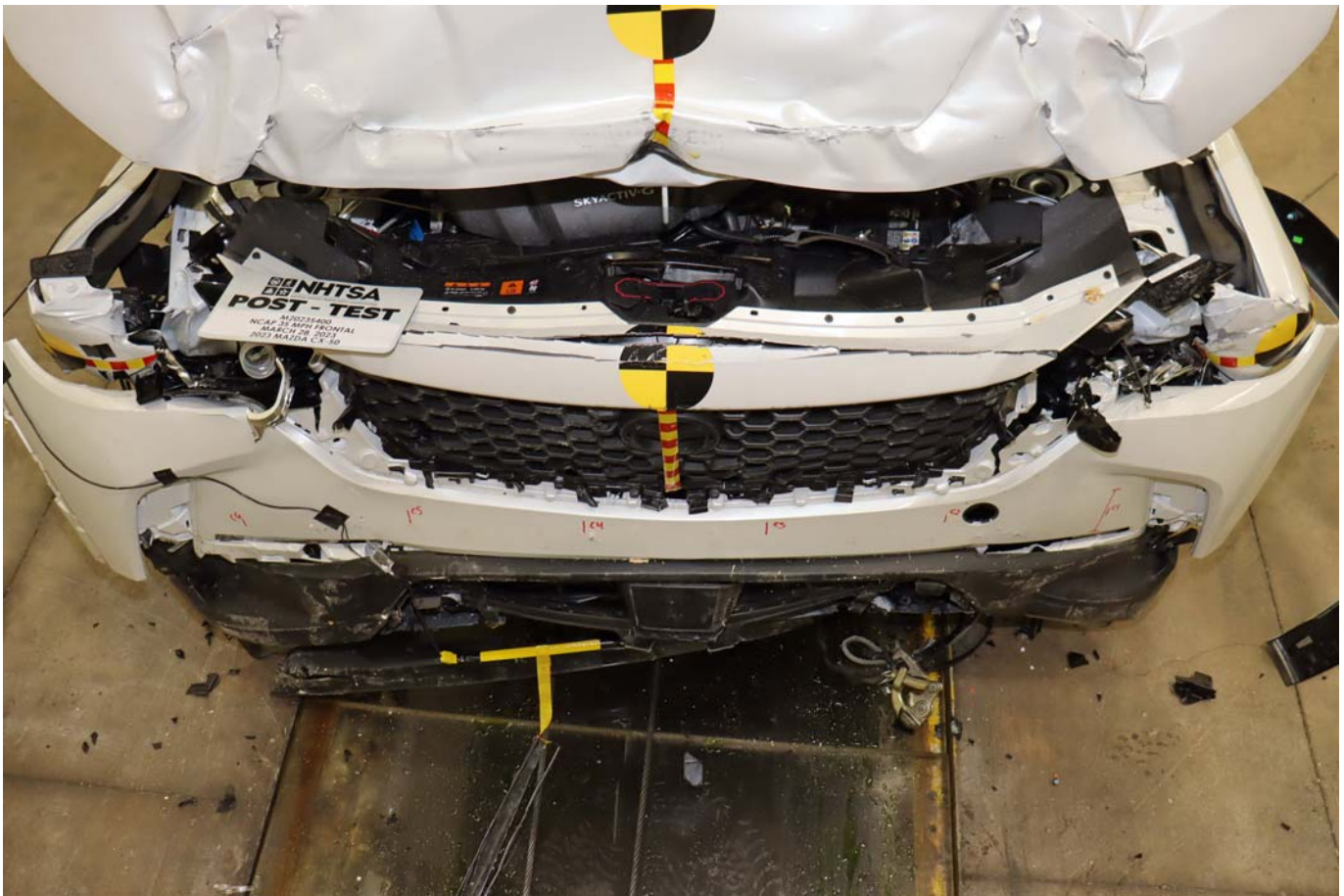


Photo No. 021 - Post-Test Engine Compartment View



Photo No. 022 - Pre-Test Fuel Filler Cap View



Photo No. 023 - Post-Test Fuel Filler Cap View

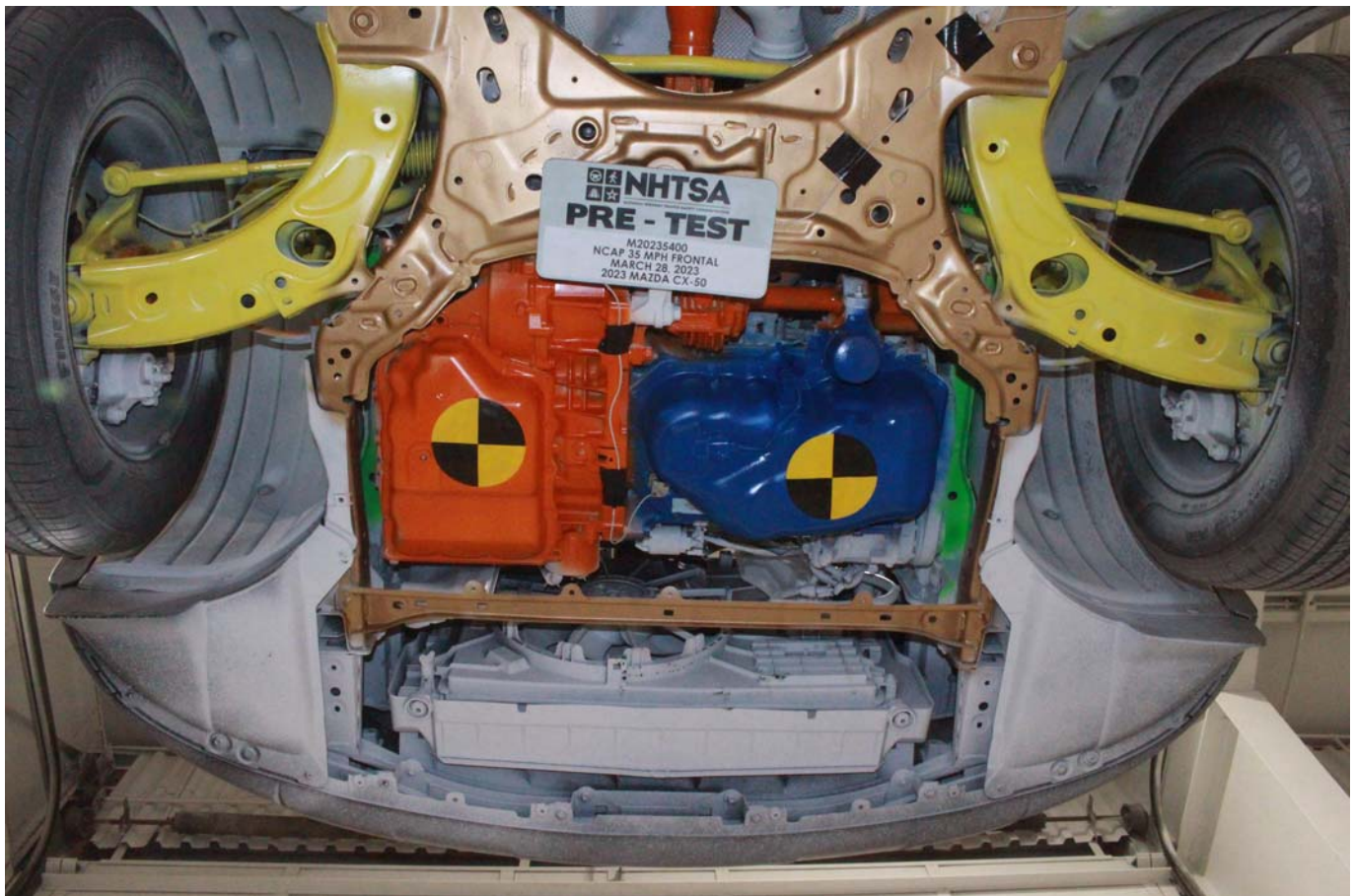


Photo No. 024 - Pre-Test Front Underbody View



Photo No. 025 - Post-Test Front Underbody View



Photo No. 026 - Pre-Test Rear Underbody View



Photo No. 027 - Post-Test Rear Underbody View



Photo No. 028 - Pre-Test Dummy Cable Routing



Photo No. 029 - Post-Test Dummy Cable Routing



Photo No. 030 - Pre-Test Driver Dummy Front View



Photo No. 031 - Post-Test Driver Dummy Front View



Photo No. 032 - Pre-Test Driver Dummy Window View



Photo No. 033 - Post-Test Driver Dummy Window View



Photo No. 034 - Pre-Test Driver Dummy and Vehicle Interior View



Photo No. 035 - Post-Test Driver Dummy and Vehicle Interior View



Photo No. 036 - Pre-Test Driver's Seat Fore-Aft Markings

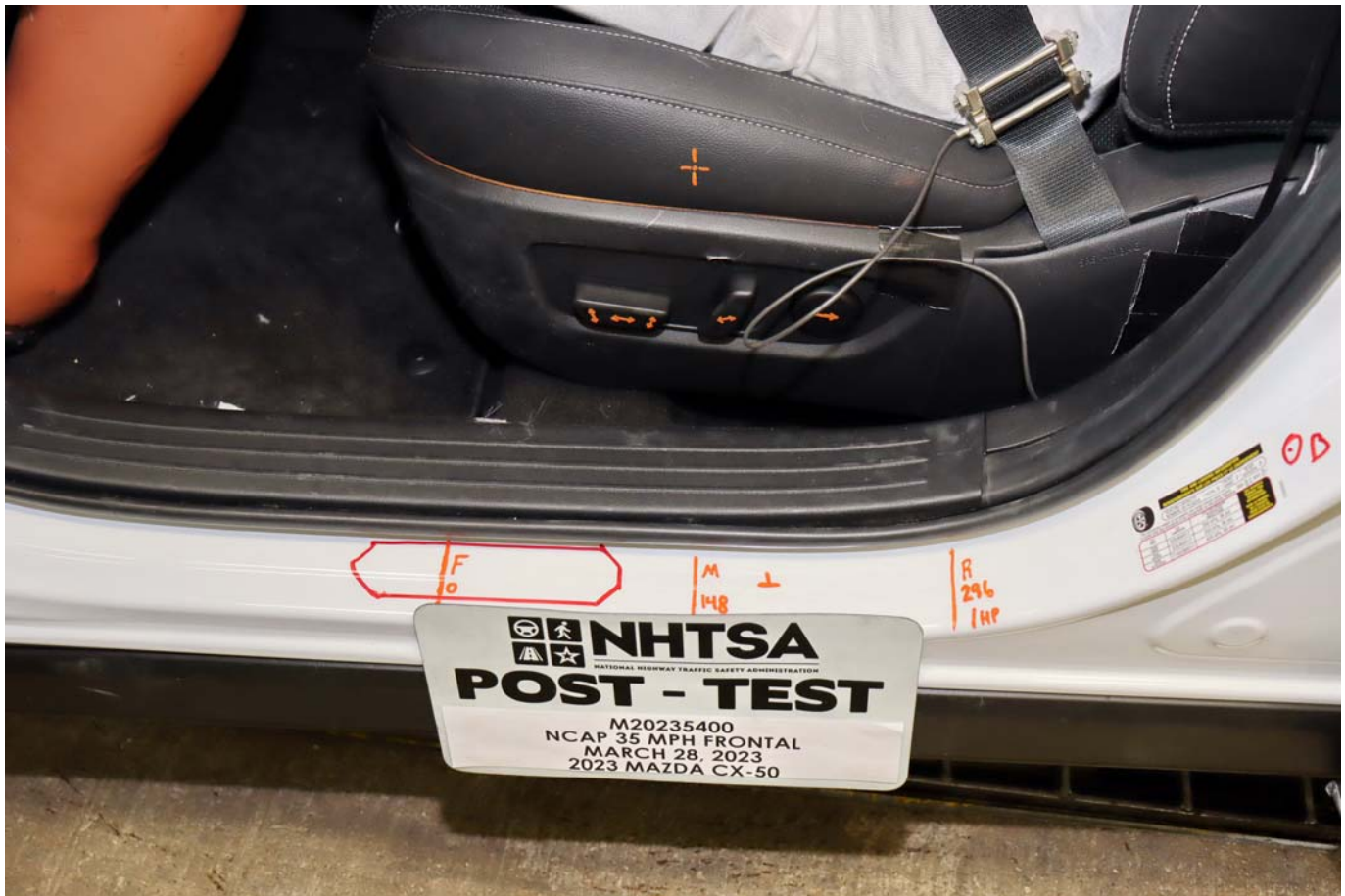


Photo No. 037 - Post-Test Driver's Seat Fore-Aft Markings



Photo No. 038 - Pre-Test View of Belt Anchorage for Driver Dummy



Photo No. 039 - Post-Test View of Belt Anchorage for Driver Dummy



Photo No. 040 - Pre-Test View of Belt Buckle and Latch Plate for Driver Dummy



Photo No. 041 - Post-Test View of Belt Buckle and Latch Plate for Driver Dummy



Photo No. 042 - Pre-Test Driver Dummy Feet



Photo No. 043 - Post-Test Driver Dummy Feet



Photo No. 044 - Pre-Test Driver's Side Knee Bolster



Photo No. 045 - Post-Test Driver's Side Knee Bolster



Photo No. 046 - Pre-Test Driver's Side Floorpan



Photo No. 047 - Post-Test Driver's Side Floorpan

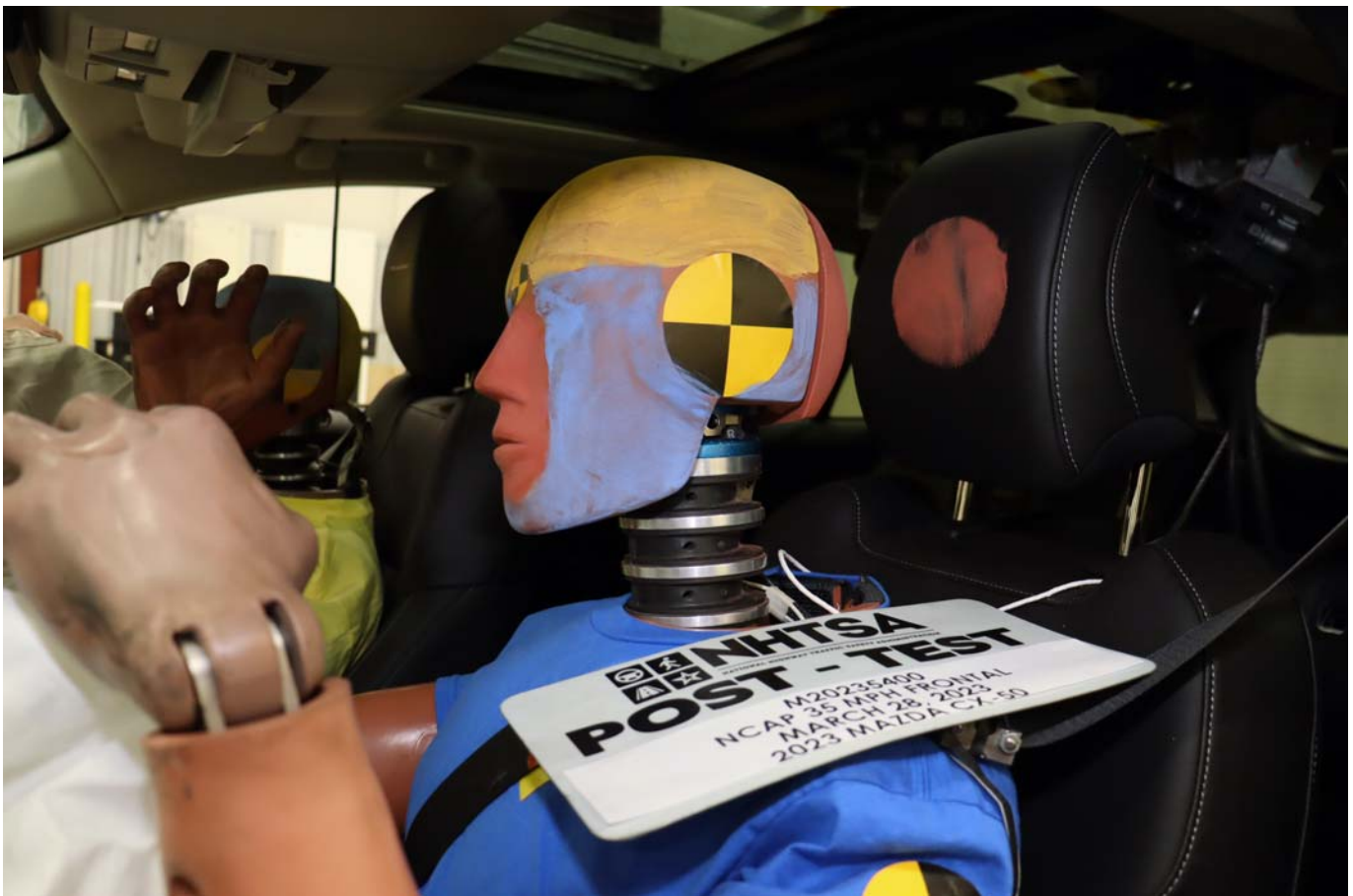


Photo No. 048 - Post-Test Driver Dummy Face

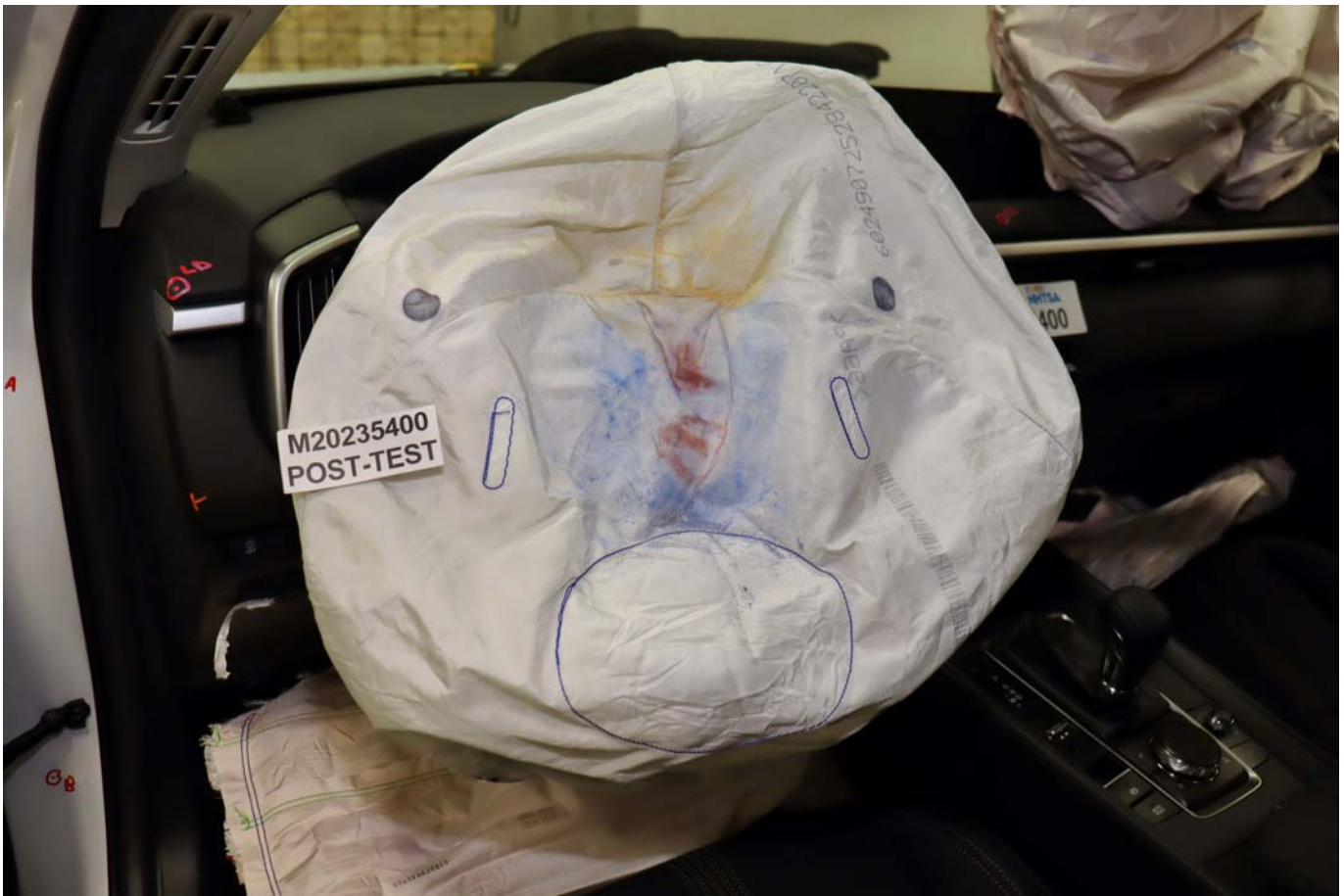


Photo No. 049 - Post-Test Driver Dummy Contact with Airbag



Photo No. 050 - Post-Test Driver Dummy Contact with Headrest



Photo No. 051 - Pre-Test View of the Steering Wheel



Photo No. 052 - Post-Test View of the Steering Wheel



Photo No. 053 - Pre-Test Passenger Dummy Front View



Photo No. 054 - Post-Test Passenger Dummy Front View



Photo No. 055 - Pre-Test Passenger Dummy Window View



Photo No. 056 - Post-Test Passenger Dummy Window View



Photo No. 057 - Pre-Test Passenger Dummy and Vehicle Interior View



Photo No. 058 - Post-Test Passenger Dummy and Vehicle Interior View



Photo No. 059 - Pre-Test Passenger's Seat Fore-Aft Markings



Photo No. 060 - Post-Test Passenger's Seat Fore-Aft Markings



Photo No. 061 - Pre-Test View of Belt Anchorage for Passenger Dummy



Photo No. 062 - Post-Test View of Belt Anchorage for Passenger Dummy



Photo No. 063 - Pre-Test View of Belt Buckle and Latch Plate for Passenger Dummy



Photo No. 064 - Post-Test View of Belt Buckle and Latch Plate for Passenger Dummy



Photo No. 065 - Pre-Test Passenger Dummy Feet



Photo No. 066 - Post-Test Passenger Dummy Feet



Photo No. 067 - Pre-Test Passenger's Side Knee Bolster



Photo No. 068 - Post-Test Passenger's Side Knee Bolster

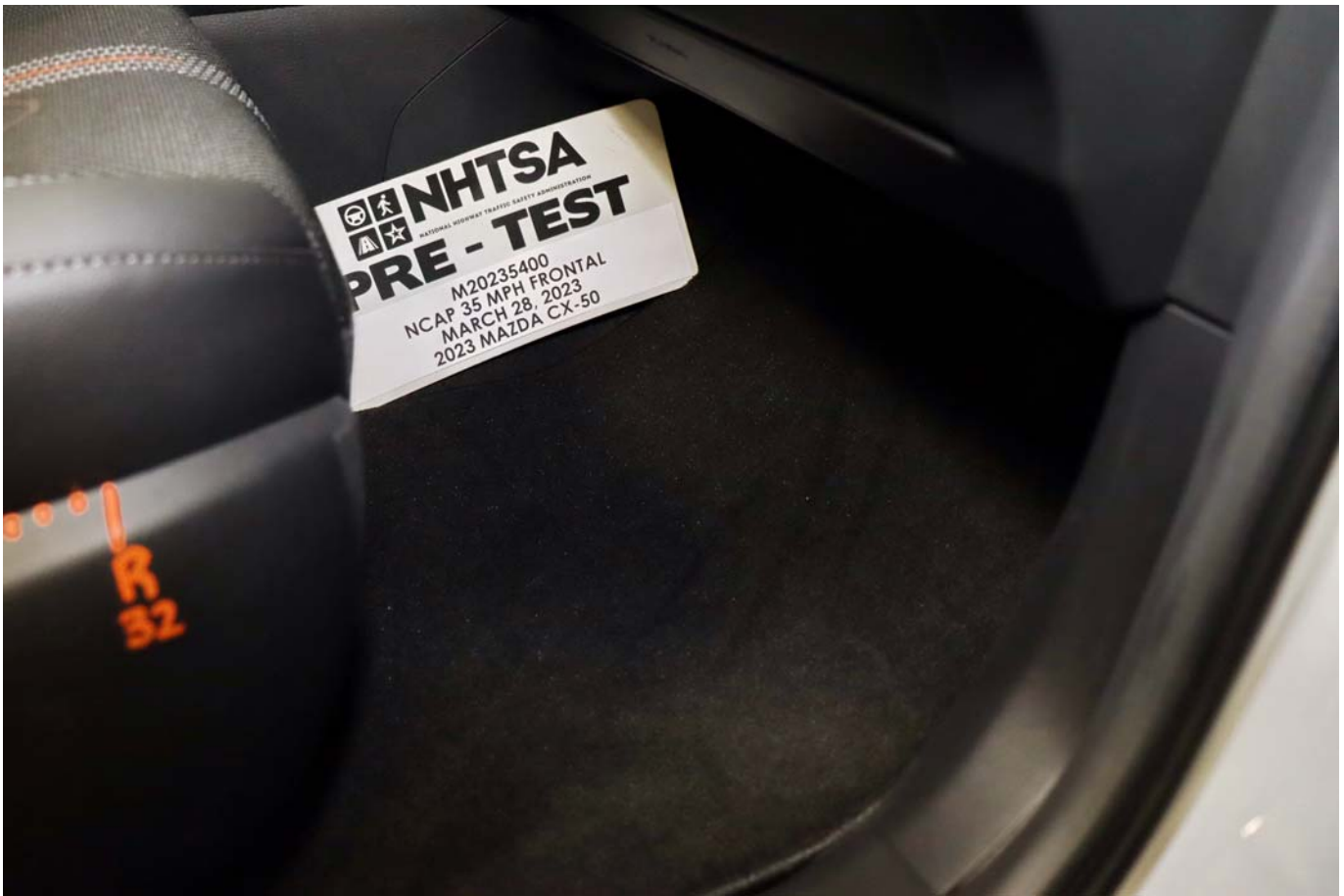


Photo No. 069 - Pre-Test Passenger's Side Floorpan



Photo No. 070 - Post-Test Passenger's Side Floorpan



Photo No. 071 - Post-Test Passenger Dummy Face



Photo No. 072 - Post-Test Passenger Dummy Contact with Airbag



Photo No. 073 - Post-Test Passenger Dummy Contact with Headrest

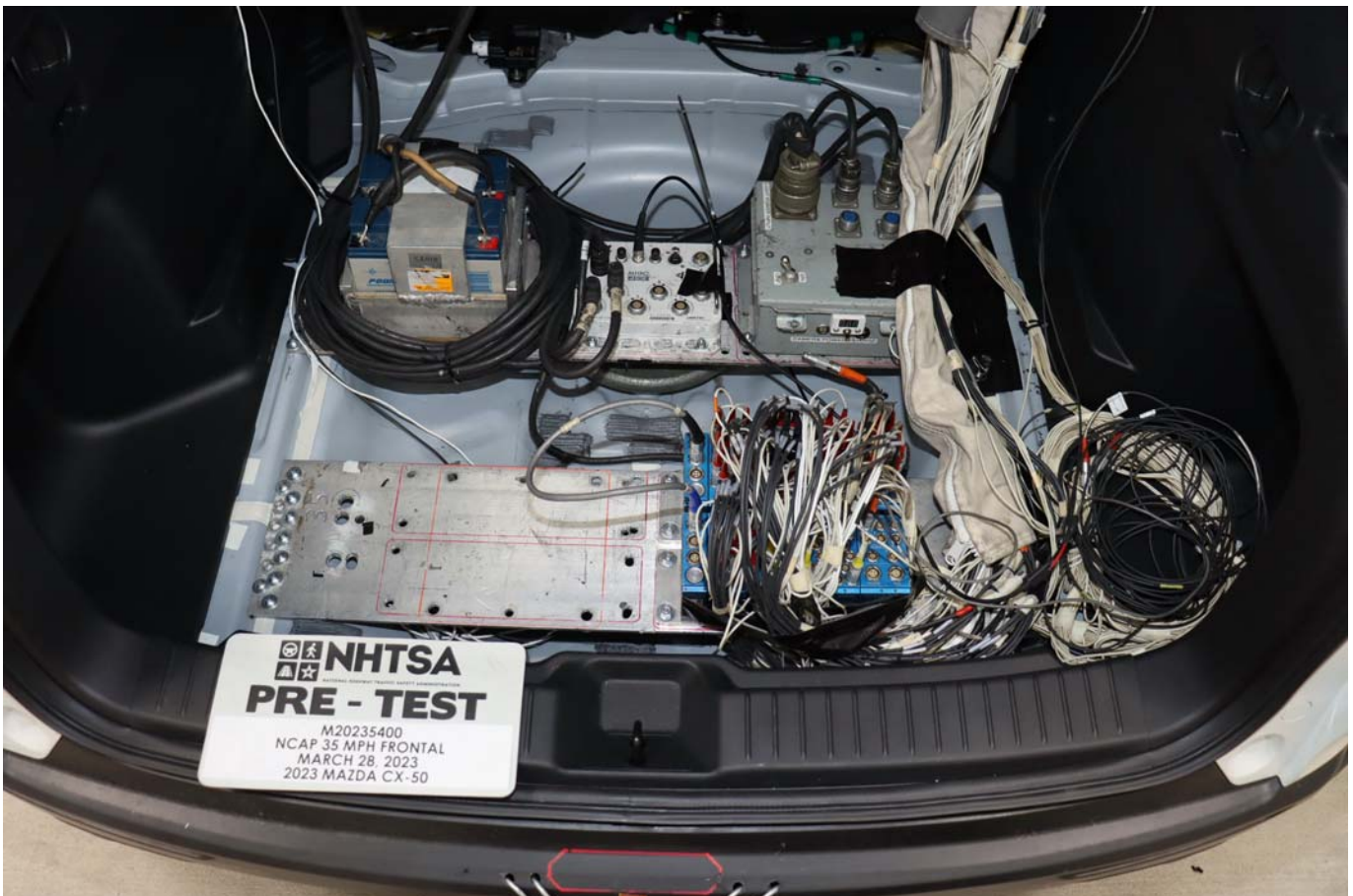


Photo No. 074 - Photograph of Ballast Installed in Vehicle

PHOTOGRAPH NOT APPLICABLE

Photo No. 075 - Post-Test Stoddard Solvent Spillage Location View



Photo No. 076 - Post-Test Speed Trap Read-Out



Photo No. 077 - Vehicle at 0 Degrees on Static Rollover Device

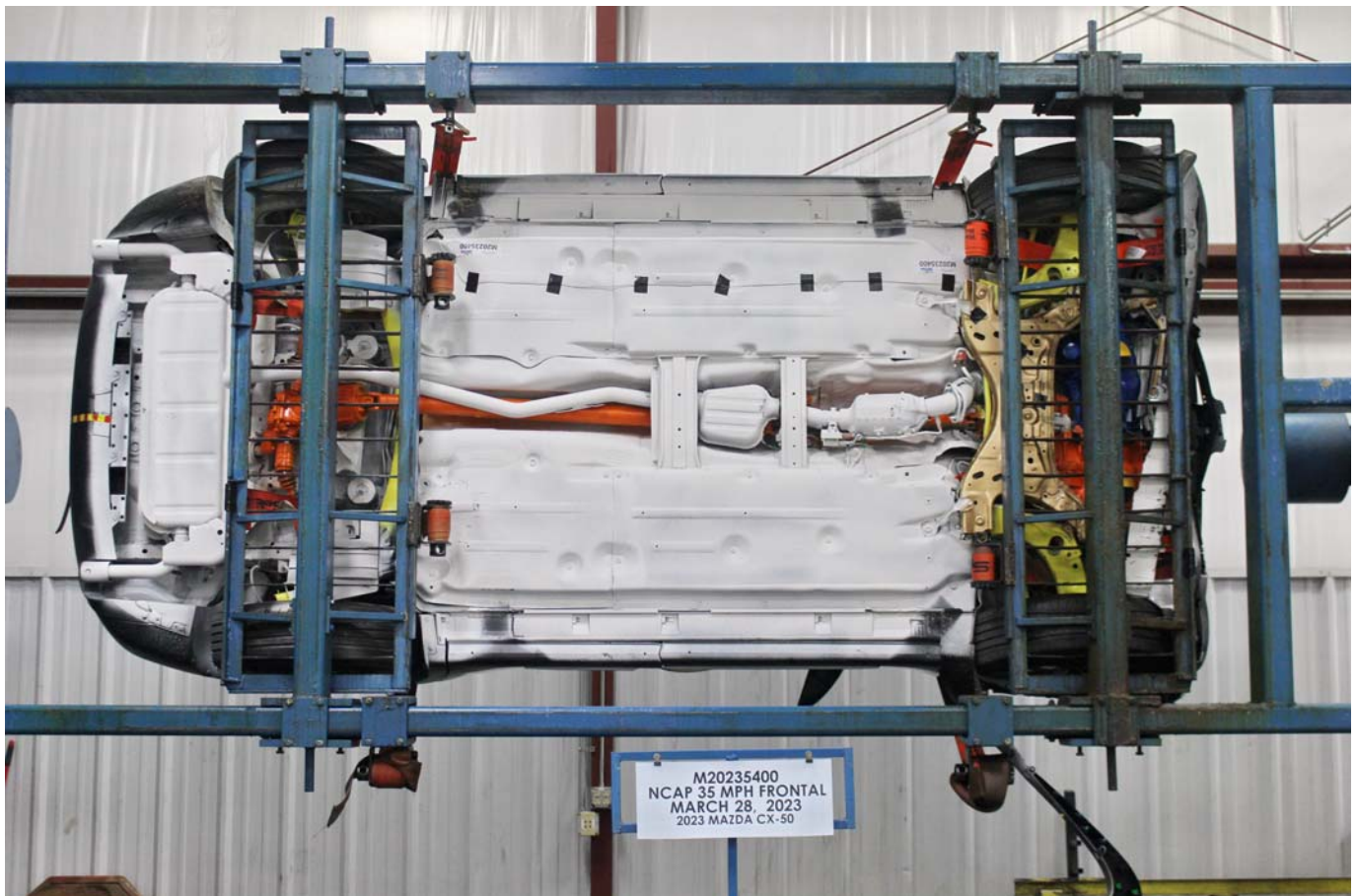


Photo No. 078 - Vehicle at 90 Degrees on Static Rollover Device



Photo No. 079 - Vehicle at 180 Degrees on Static Rollover Device



Photo No. 080 - Vehicle at 270 Degrees on Static Rollover Device



Photo No. 081 - Vehicle at 360 Degrees on Static Rollover Device

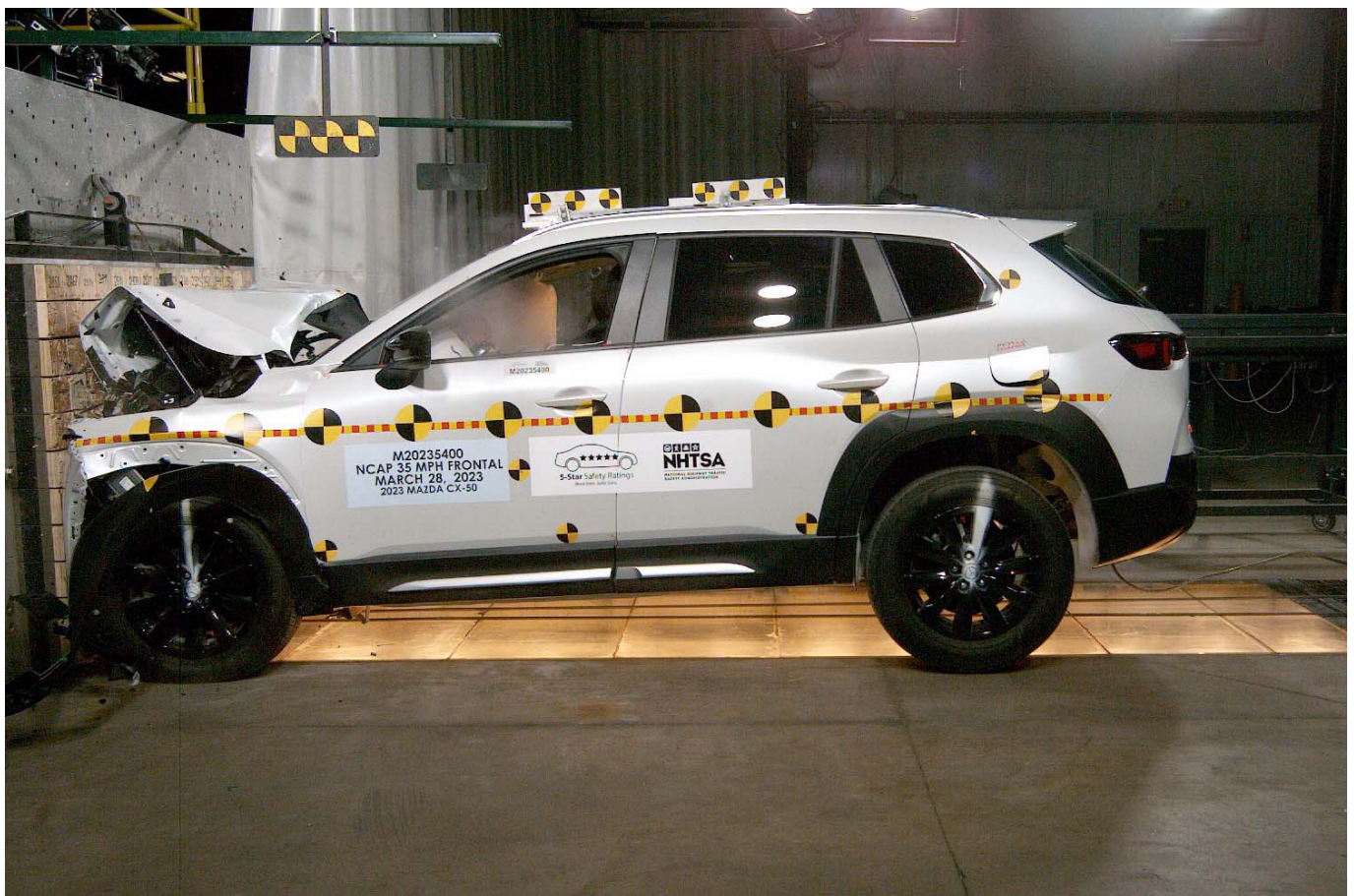


Photo No. 082 - 2023 Mazda CX-50 AWD 5-Door SUV Frontal Impact Event



2023 Mazda CX-50

Model: CX-50 2.5 S W/ PREFERRED PLUS PKG AWD
Exterior Color: WIND CHILL PEARL
Interior Color: BLACK W/ GRAY

EPA DOT Fuel Economy and Environment

Gasoline Vehicle

Fuel Economy
27 MPG
combined city/hwy
24 city
30 highway
3.7 gallons per 100 miles

You spend \$250
more in fuel costs
over 5 years
compared to the
average new vehicle.

Annual fuel cost \$1,650

Fuel Economy & Greenhouse Gas Rating (tailpipe only)

1 5 10 Best
This vehicle emits 335 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov.

Smog Rating (tailpipe only)

1 7 10 Best
This vehicle emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 28 MPG and costs \$8,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$2.35 per gallon. MPG is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles



PARTS CONTENT INFORMATION:

FOR VEHICLES IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT:
50%
MAJOR SOURCES OF FOREIGN
PARTS CONTENT: MEXICO 25%,
JAPAN 20%

NOTE: PARTS CONTENT DOES
NOT INCLUDE FINAL ASSEMBLY,
DISTRIBUTION, OR OTHER
NON-PARTS COSTS.

FOR THIS VEHICLE:
FINAL ASSEMBLY POINT:
MADISON, AL, U.S.
COUNTRY OF ORIGIN:
ENGINE: MEXICO
TRANSMISSION: JAPAN

This label is affixed pursuant to the Federal
Automobile Disclosure Act. Gasoline, License
and Title fees, State and Local taxes, and
Dealer installed options are not included.

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score Not Rated
Based on the combined ratings of frontal, side and rollover.
Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash Driver Passenger Not Rated
Based on the risk of injury in a frontal impact.
Should ONLY be compared to other vehicles of similar size and weight.

Side Crash Front seat Rear seat Not Rated
Based on the risk of injury in a side impact.

Rollover Not Rated
Based on the risk of rollover in a single vehicle crash.

Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest.
Source: National Highway Traffic Safety Administration (NHTSA)
www.safercar.gov or 1-888-327-4236

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7MMVABCM5PN125585



MazdaUSA.com

STANDARD EQUIPMENT

ENGINE/MECHANICAL FEATURES

- SKYACTIV-G 2.5L ENGINE W/ VCT/ LINDER DEACTIVATION
- 187 HORSEPOWER, 186 LB.-FT TORQUE
- SKYACTIV-DRIVE 6SPD AT
- 4 WHEEL DISC BRAKES

EXTERIOR FEATURES

- BLACK 17-INCH ALLOY WHEELS
- P225/65R17 ALL-SEASON TIRES
- RAIN-SENSING WINDSHIELD WIPERS
- WIPER DEICER
- REAR ROOF SPOILER
- ROOF RAILS

INTERIOR FEATURES

- 5-PASSENGER SEATING
- HALF LEATHERETTE-TRIMMED SEATS
- POWER DRIVER SEAT WITH POWER LUMBAR SUPPORT
- HEATED FRONT SEATS
- 40/60 SPLIT FOLD-DOWN REAR SEAT
- POWER DOOR LOCKS & POWER WINDOWS
- ELECTRONIC PARKING BRAKE
- LEATHER-WRAPPED STEERING WHEEL
- LEATHER-WRAPPED SHIFT KNOB
- PUSH BUTTON ENGINE START
- MAZDA ADVANCED KEYSLESS ENTRY
- REARVIEW CAMERA
- POWER REAR LIFTGATE

SAFETY AND SECURITY FEATURES

- 60MO/36K MI POWERTRAIN & 36MO/ 36K MI BUMPER-TO-BUMPER WARRANTY
- 24-HOUR ROADSIDE ASSISTANCE
- 5-PASSENGER 3-POINT SAFETY BELTS
- LATCH CHILD SAFETY SEAT ANCHORS
- ANTI-THEFT ENGINE IMMOBILIZER
- TIRE PRESSURE MONITORING SYSTEM
- LANE DEPARTURE WARNING SYSTEM
- LANE KEEP ASSIST
- BLIND SPOT MONITORING
- REAR CROSS TRAFFIC ALERT

- I-ACTIV ALL-WHEEL DRIVE
- HILL LAUNCH ASSIST
- G-VECTORING CONTROL PLUS
- MI-DRIVE - SPORT/OFF-ROAD MODES
- 2000 LB TOWING CAPACITY

- REAR PRIVACY GLASS
- LED HEADLIGHTS W/ AUTO ON/OFF
- DAYTIME RUNNING LIGHTS
- HIGH BEAM CONTROL
- DUAL HEATED POWER SIDE MIRRORS
- DUAL EXHAUST OUTLETS

- 10.25" COLOR CENTER DISPLAY
- MULTI-FUNCTION COMMANDER CONTROL
- DUAL-ZONE AUTO CLIMATE CONTROL
- REAR AIR CONDITIONING VENTS
- MAZDA CONNECTED SERVICES
- AM/FM/HD RADIO WITH 8-SPEAKERS
- BLUETOOTH HANDS-FREE PHONE/AUDIO
- 4 USB INPUTS
- ILLUMINATED VANITY MIRRORS
- OVERHEAD CONSOLE WITH SUNGLASS HOLDER AND LED ROOM LAMP
- WIRELESS ANDROID AUTO™
- WIRELESS APPLE CARPLAY™
- CARPETED FLOOR MATS

- ABS WITH EBD AND BRAKE-ASSIST
- DYNAMIC STABILITY CONTROL
- TRACTION CONTROL SYSTEM
- ADVANCED DUAL FRONT AIRBAGS
- FRONT SIDE IMPACT AIR BAGS
- FRONT & REAR SIDE AIR CURTAINS
- FRONT KNEE AIR BAGS
- SMART BRAKE SUPPORT
- DRIVER ATTENTION ALERT
- MAZDA RADAR CRUISE CONTROL WITH STOP & GO

MSRP \$32,690

OPTIONAL EQUIPMENT

- JCW WIND CHILL PEARL PAINT CHARGE \$395
- RCC RETRACTABLE CARGO COVER \$225
- 1AC ACCENT PACKAGE \$550
- 2PF ILLUMINATED DOOR SILL TRIM PLATES
- PREFERRED PLUS PACKAGE
- POWER PANORAMIC MOONROOF

- SIDE ROCKER TRIM

NO CHARGE

Total Vehicle and Options \$33,860
Delivery, Processing and Handling Fee \$1,275

Total MSRP \$35,135

Photo No. 083 - Monroney Label Photograph

APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

Page No.

List of Data Plots Provided in the Test Report

Figure No. 1.	Driver Head X Acceleration vs. Time	B-1
Figure No. 2.	Driver Head Y Acceleration vs. Time	B-1
Figure No. 3.	Driver Head Z Acceleration vs. Time	B-1
Figure No. 4.	Driver Head Resultant Acceleration vs. Time	B-1
Figure No. 5.	Driver Chest Displacement vs. Time	B-2
Figure No. 6.	Driver Chest X Acceleration vs. Time	B-3
Figure No. 7.	Driver Chest Y Acceleration vs. Time	B-3
Figure No. 8.	Driver Chest Z Acceleration vs. Time	B-3
Figure No. 9.	Driver Chest Resultant Acceleration vs. Time	B-3
Figure No. 10.	Driver Neck Force X vs. Time	B-4
Figure No. 11.	Driver Neck Force Z vs. Time	B-4
Figure No. 12.	Driver Neck Moment Y vs. Time	B-4
Figure No. 13.	Driver Nij (NTF) vs. Time	B-5
Figure No. 14.	Driver Nij (NTE) vs. Time	B-5
Figure No. 15.	Driver Nij (NCF) vs. Time	B-5
Figure No. 16.	Driver Nij (NCE) vs. Time	B-5
Figure No. 17.	Driver Left Femur Force vs. Time	B-6
Figure No. 18.	Driver Right Femur Force vs. Time	B-6
Figure No. 19.	Passenger Head X Acceleration vs. Time	B-7
Figure No. 20.	Passenger Head Y Acceleration vs. Time	B-7
Figure No. 21.	Passenger Head Z Acceleration vs. Time	B-7
Figure No. 22.	Passenger Head Resultant Acceleration vs. Time	B-7
Figure No. 23.	Passenger Chest Displacement vs. Time	B-8
Figure No. 24.	Passenger Chest X Acceleration vs. Time	B-9
Figure No. 25.	Passenger Chest Y Acceleration vs. Time	B-9
Figure No. 26.	Passenger Chest Z Acceleration vs. Time	B-9
Figure No. 27.	Passenger Chest Resultant Z Acceleration vs. Time	B-9

	<u>Page No.</u>
Figure No. 28. Passenger Neck Force X vs. Time	B-10
Figure No. 29. Passenger Neck Force Z vs. Time	B-10
Figure No. 30. Passenger Neck Moment Y vs. Time	B-10
Figure No. 31. Passenger Nij (NTF) vs. Time	B-11
Figure No. 32. Passenger Nij (NTE) vs. Time	B-11
Figure No. 33. Passenger Nij (NCF) vs. Time	B-11
Figure No. 34. Passenger Nij (NCE) vs. Time	B-11
Figure No. 35. Passenger Left Femur Force vs. Time	B-12
Figure No. 36. Passenger Right Femur Force vs. Time	B-12

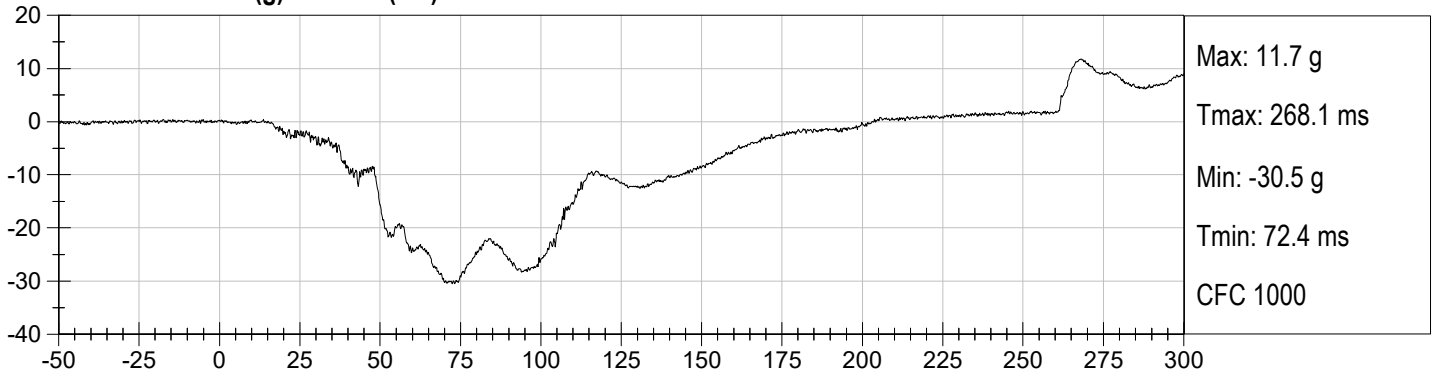
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.gov

Driver Head X Redundant
 Driver Head Y Redundant
 Driver Head Z Redundant
 Driver Head Angular Velocity X
 Driver Head Angular Velocity Y
 Driver Head Angular Velocity Z
 Driver Upper Neck Force Y
 Driver Upper Neck Moment X
 Driver Upper Neck Moment Z
 Driver Chest X Redundant
 Driver Chest Y Redundant
 Driver Chest Z Redundant
 Driver Pelvis X
 Driver Pelvis Y
 Driver Pelvis Z
 Driver Left Femur Redundant
 Driver Right Femur Redundant
 Driver Left Upper Tibia Moment X
 Driver Left Upper Tibia Moment Y

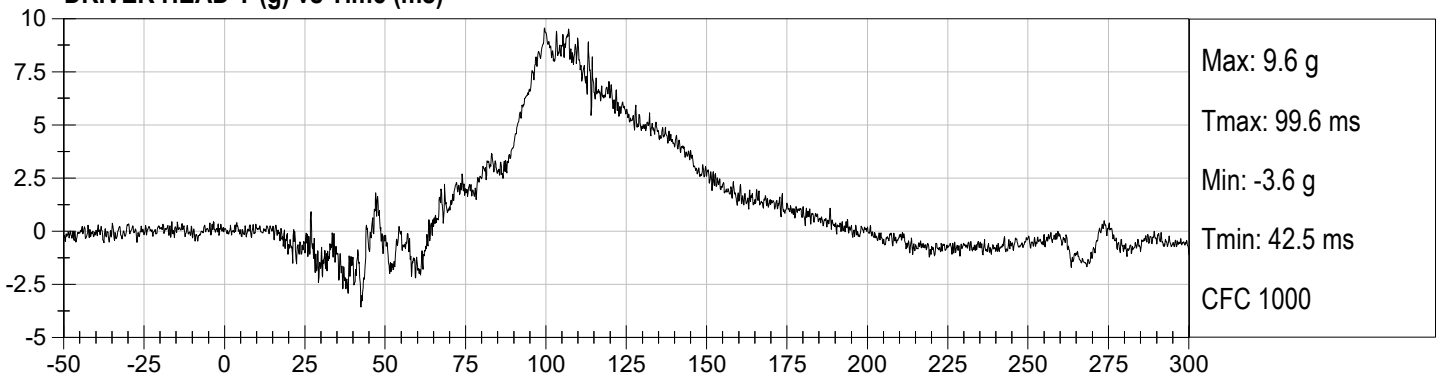
Driver Left Upper Tibia Force Z
Driver Left Lower Tibia Moment X
Driver Left Lower Tibia Moment Y
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot Fore Z
Driver Left Foot Aft X
Driver Left Foot Aft Z
Driver Right Foot Fore Z
Driver Right Foot Aft X
Driver Right Foot Aft Z
Driver Lap Belt Force
Driver Shoulder Belt Force
Passenger Head X Redundant
Passenger Head Y Redundant
Passenger Head Z Redundant
Passenger Head Angular Velocity X
Passenger Head Angular Velocity Y
Passenger Head Angular Velocity Z
Passenger Upper Neck Force Y
Passenger Upper Neck Moment X
Passenger Upper Neck Moment Z
Passenger Chest X Redundant
Passenger Chest Y Redundant
Passenger Chest Z Redundant
Passenger Pelvis X
Passenger Pelvis Y

Passenger Pelvis Z
Passenger Left Femur Redundant
Passenger Right Femur Redundant
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger Left Foot Fore Z
Passenger Left Foot Aft X
Passenger Left Foot Aft Z
Passenger Right Foot Fore Z
Passenger Right Foot Aft X
Passenger Right Foot Aft Z
Passenger Lap Belt Force
Passenger Shoulder Belt Force
Left Rear Seat Crossmember X
Right Rear Seat Crossmember X
Vehicle Engine Top X
Vehicle Engine Bottom X
Left Rear Seat Crossmember Z
Right Rear Seat Crossmember Z
Left Rear Seat Crossmember Xr
Right Rear Seat Crossmember Xr
Advanced Research Load Cell Barrier – 528 channels

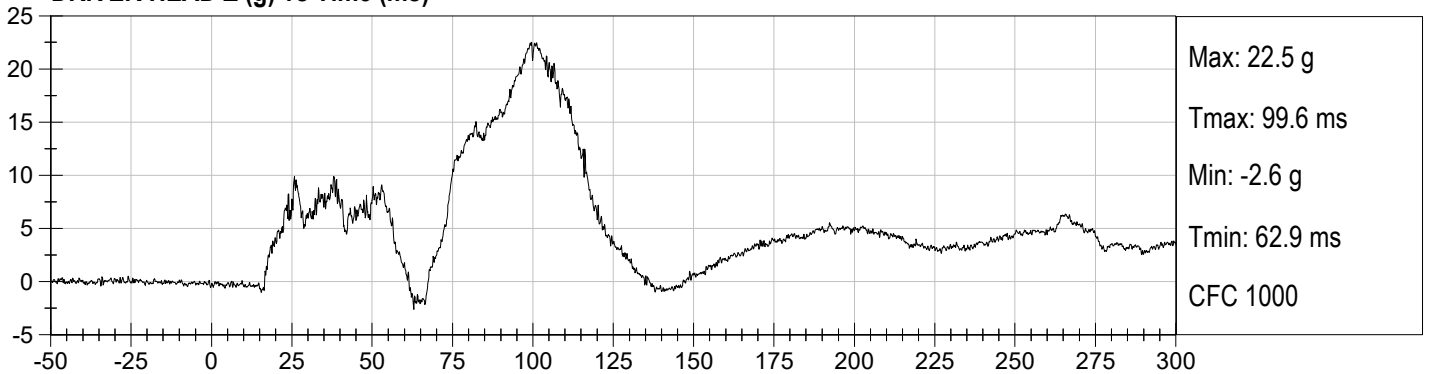
DRIVER HEAD X (g) vs Time (ms)



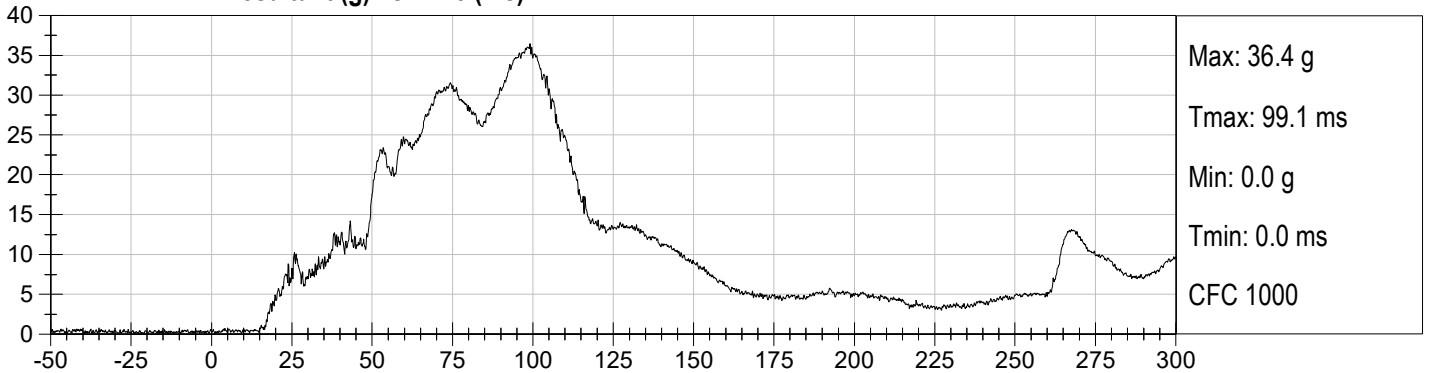
DRIVER HEAD Y (g) vs Time (ms)

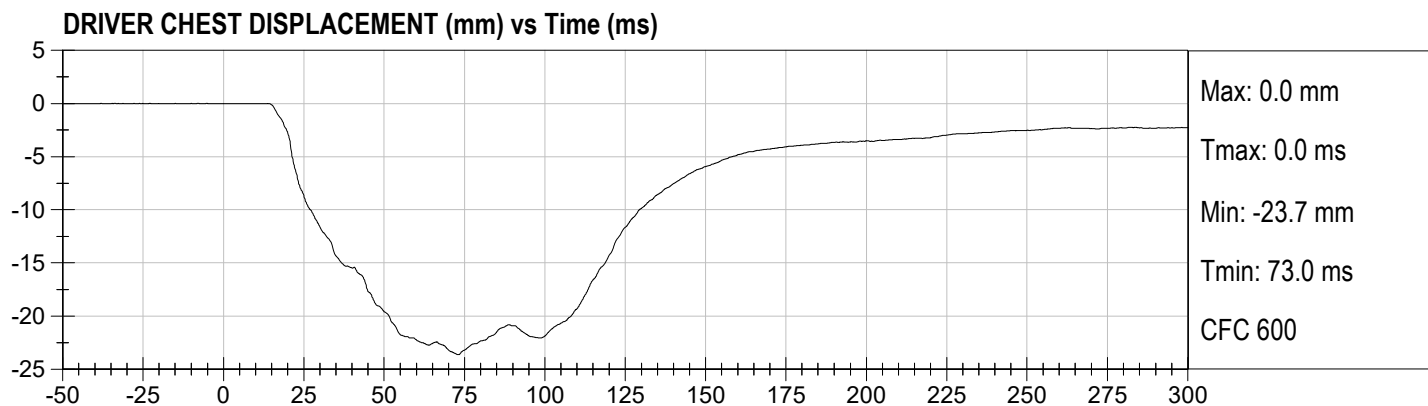


DRIVER HEAD Z (g) vs Time (ms)

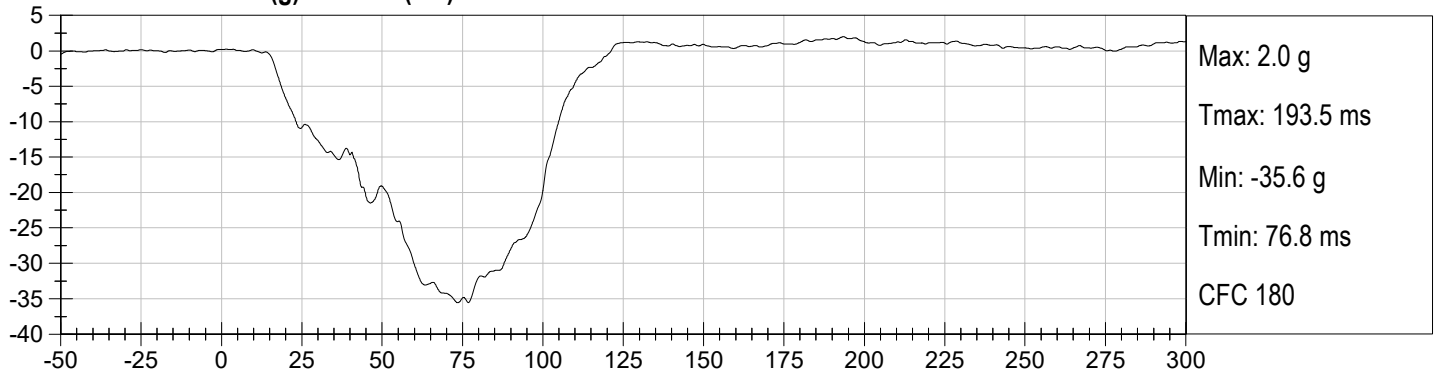


DRIVER HEAD Resultant (g) vs Time (ms)





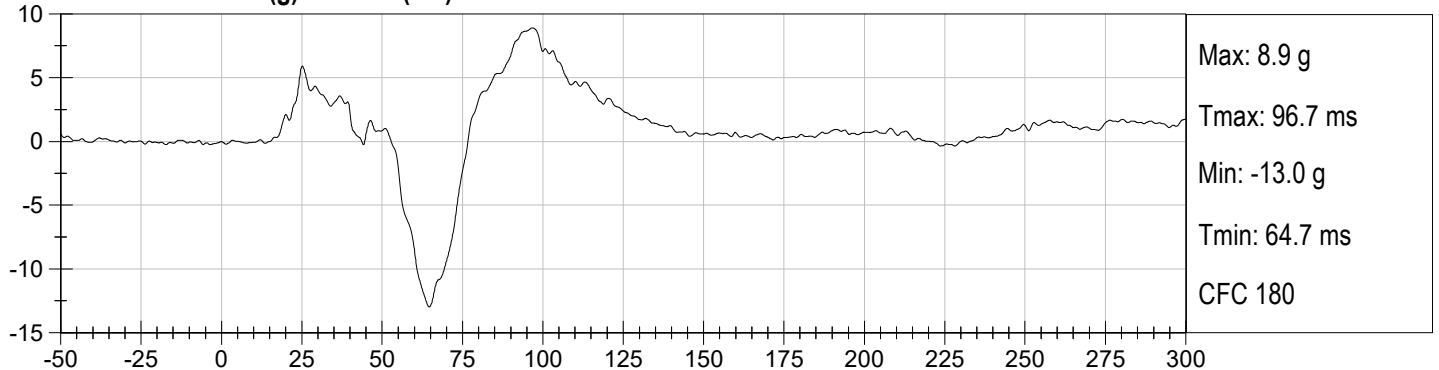
DRIVER CHEST X (g) vs Time (ms)



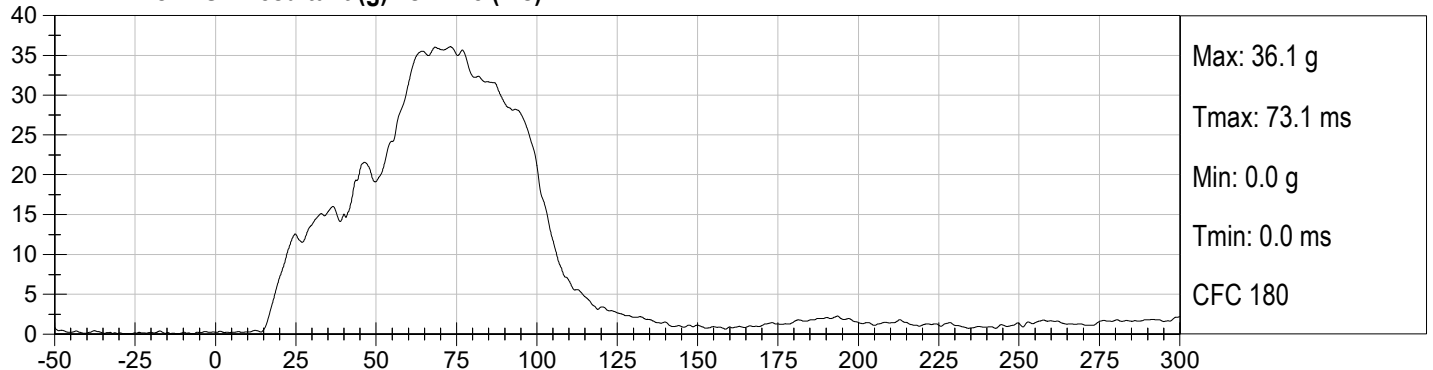
DRIVER CHEST Y (g) vs Time (ms)



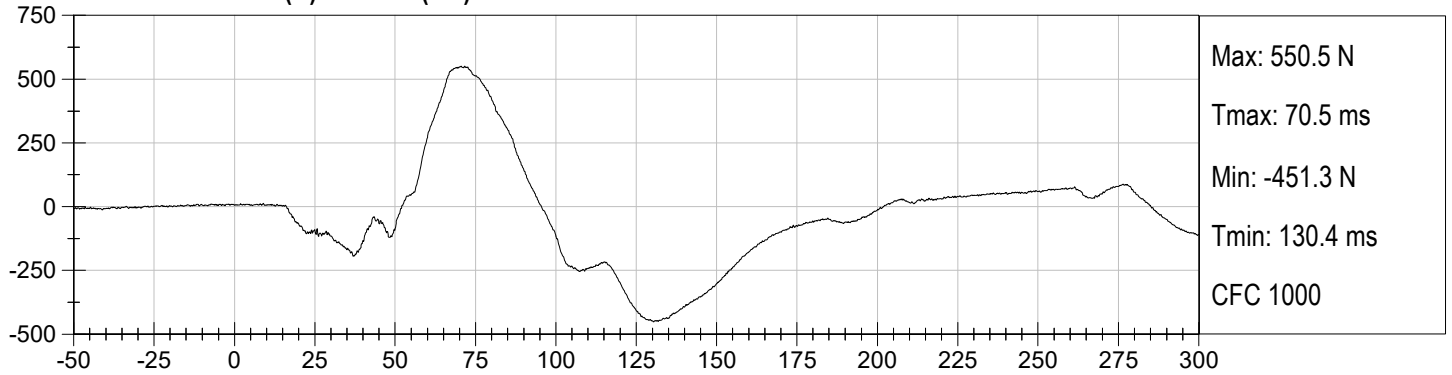
DRIVER CHEST Z (g) vs Time (ms)



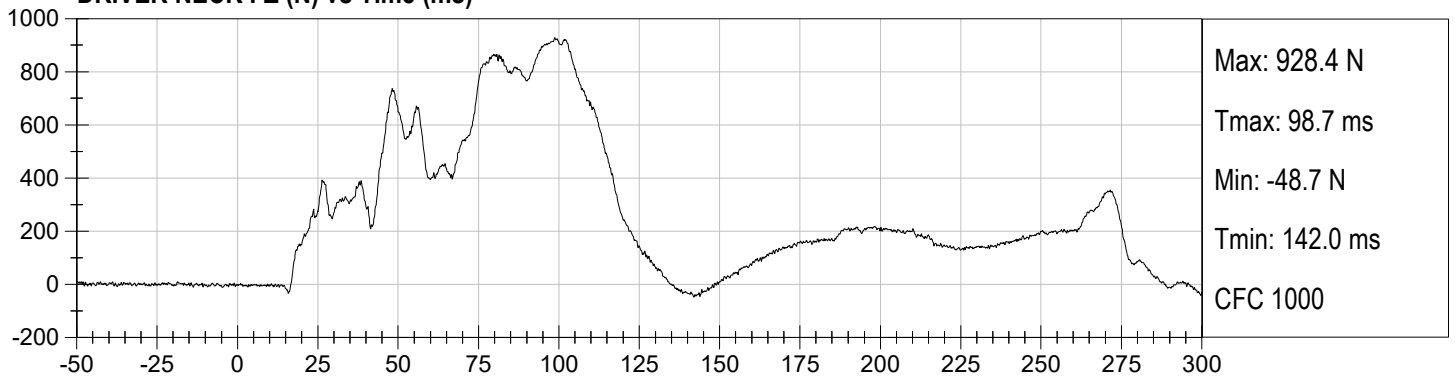
DRIVER CHEST Resultant (g) vs Time (ms)



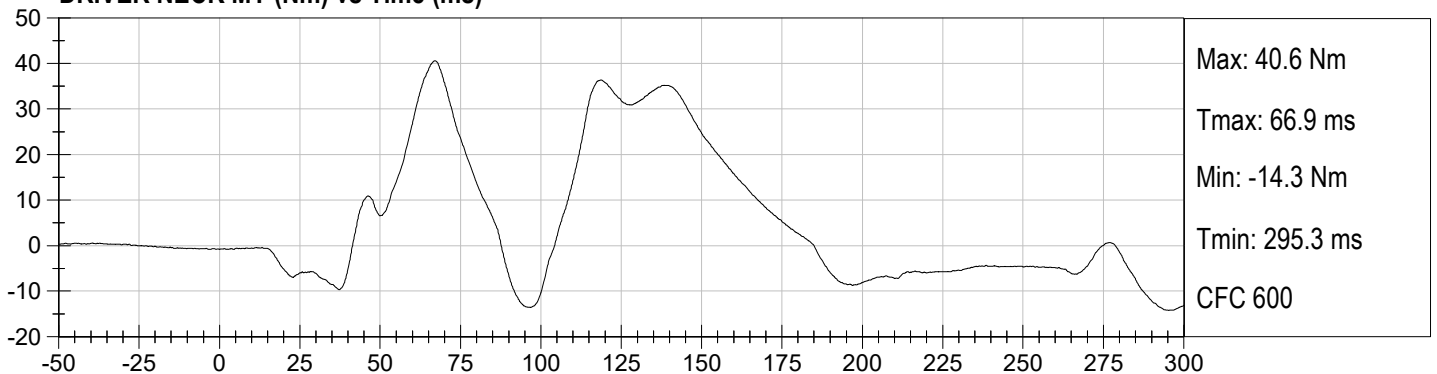
DRIVER NECK FX (N) vs Time (ms)



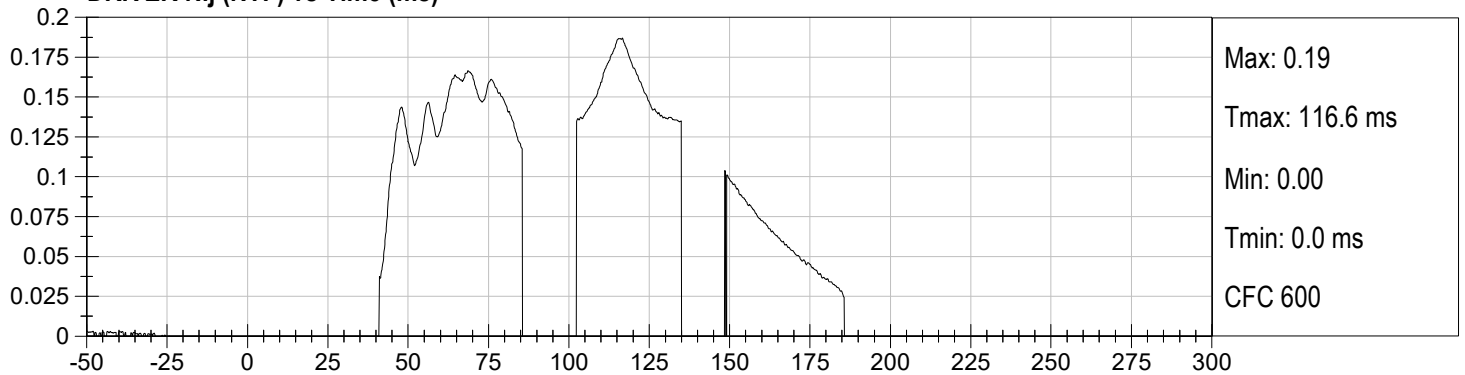
DRIVER NECK FZ (N) vs Time (ms)



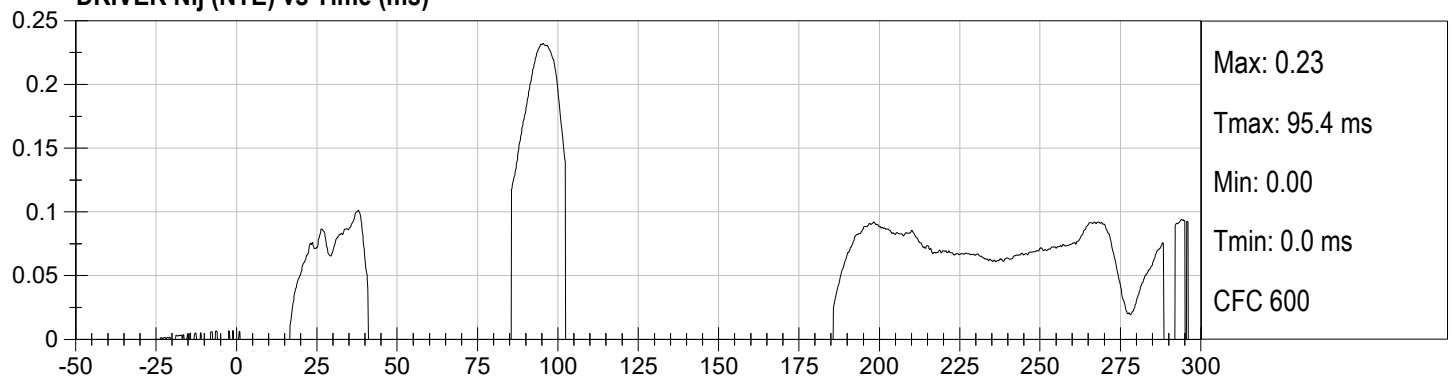
DRIVER NECK MY (Nm) vs Time (ms)



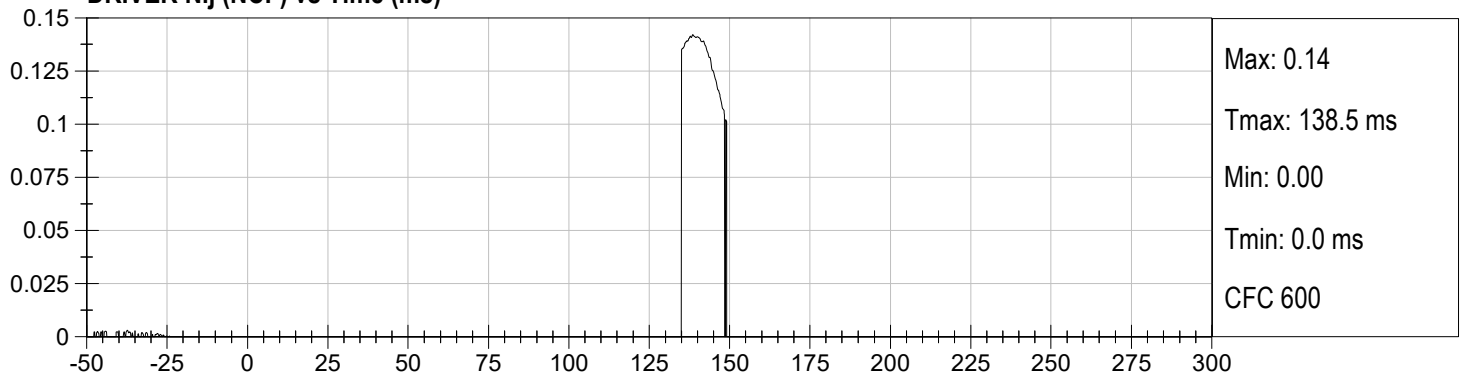
DRIVER Nij (NTF) vs Time (ms)



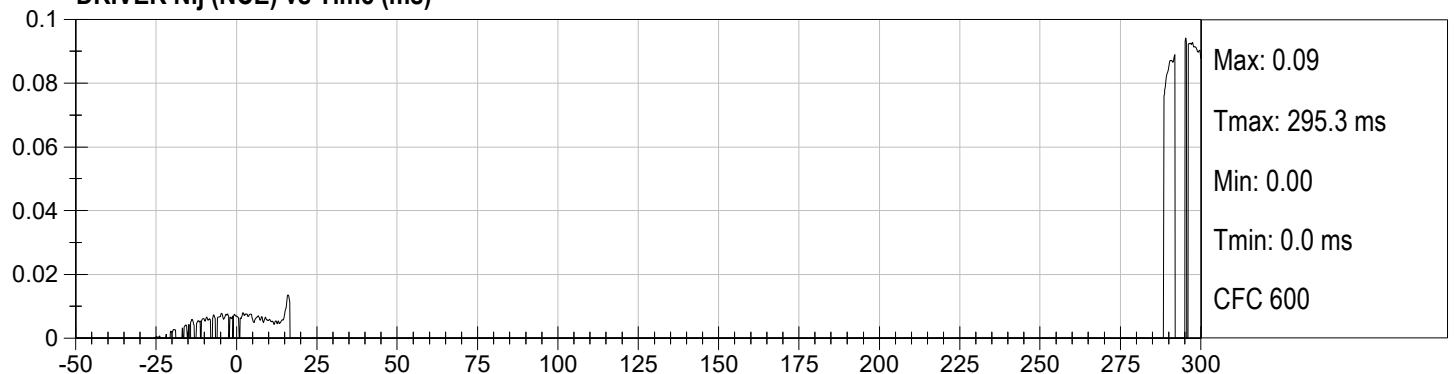
DRIVER Nij (NTE) vs Time (ms)



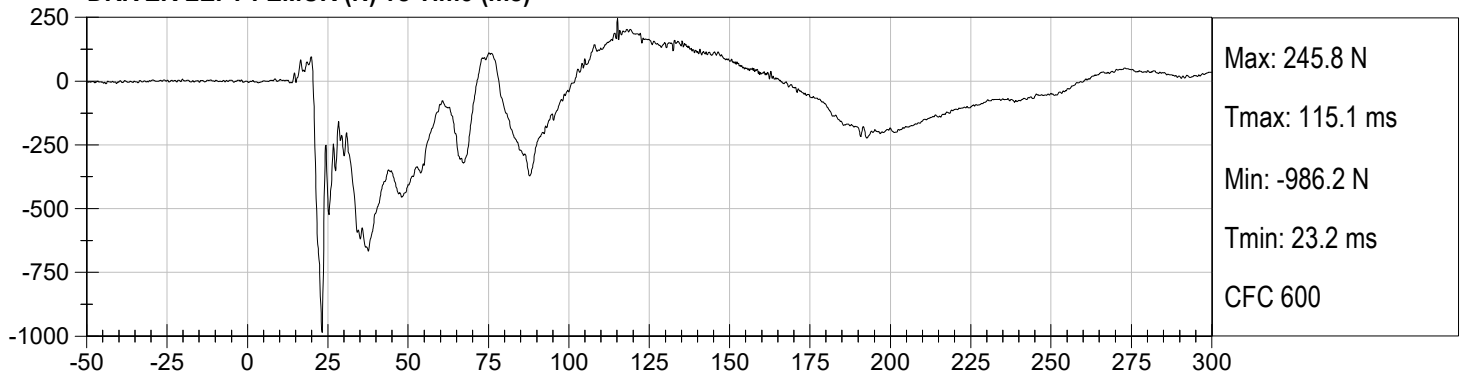
DRIVER Nij (NCF) vs Time (ms)



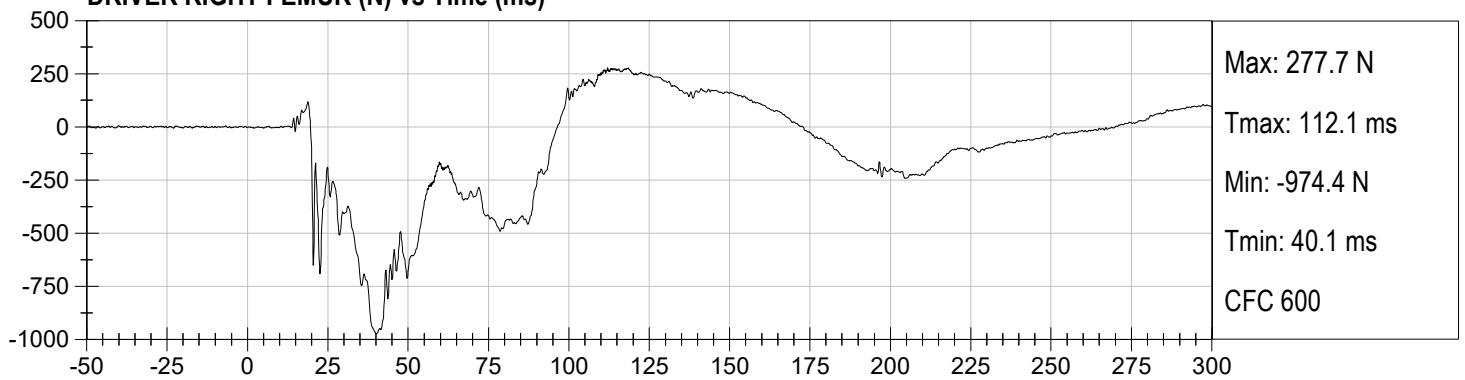
DRIVER Nij (NCE) vs Time (ms)



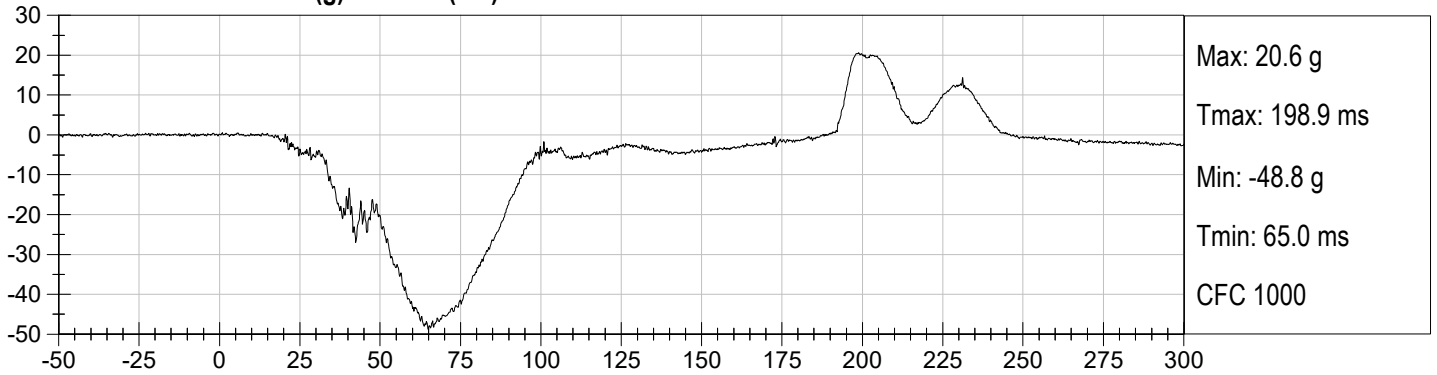
DRIVER LEFT FEMUR (N) vs Time (ms)



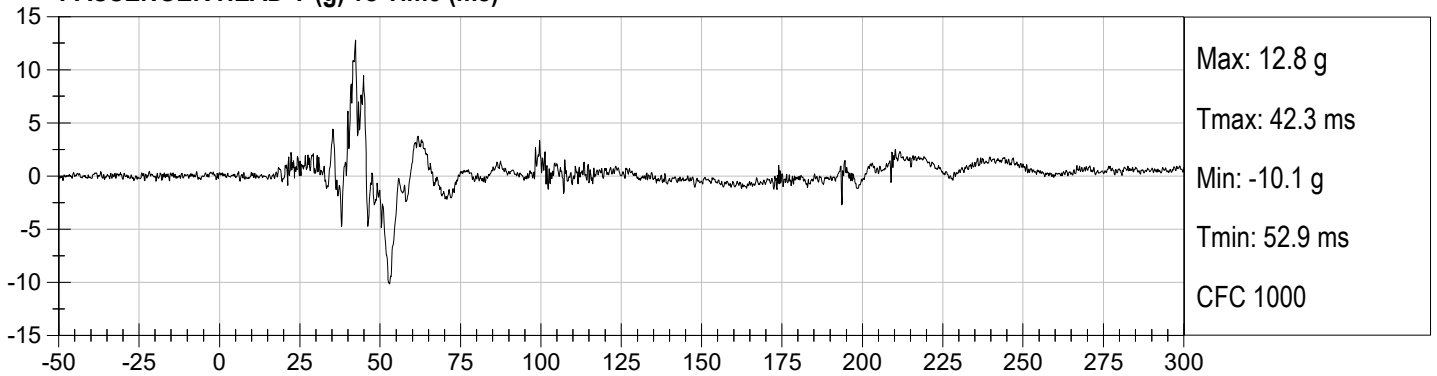
DRIVER RIGHT FEMUR (N) vs Time (ms)



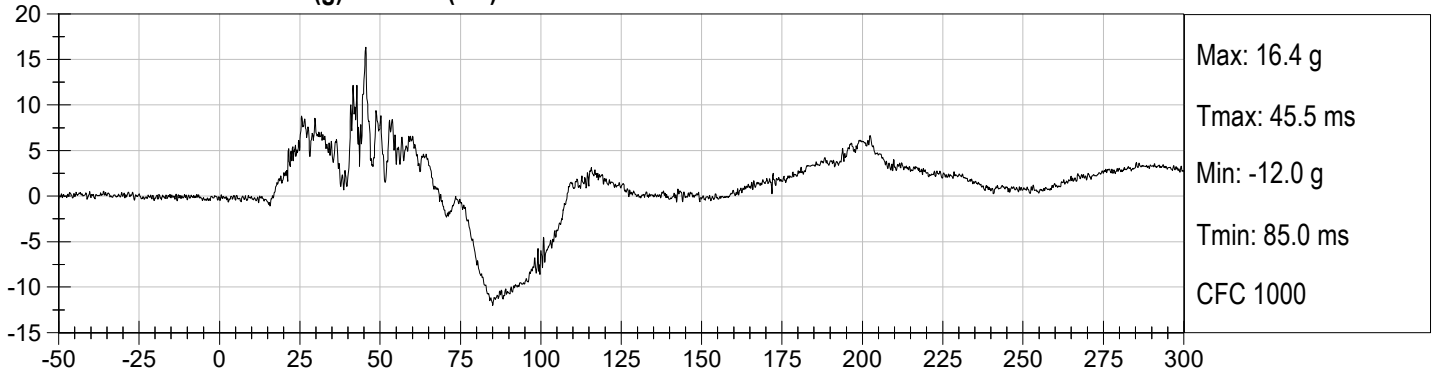
PASSENGER HEAD X (g) vs Time (ms)



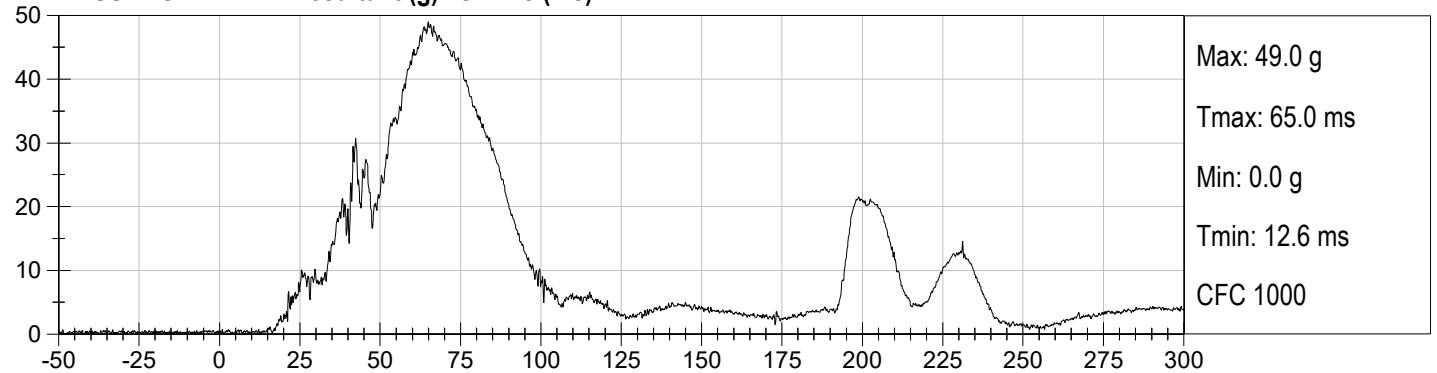
PASSENGER HEAD Y (g) vs Time (ms)

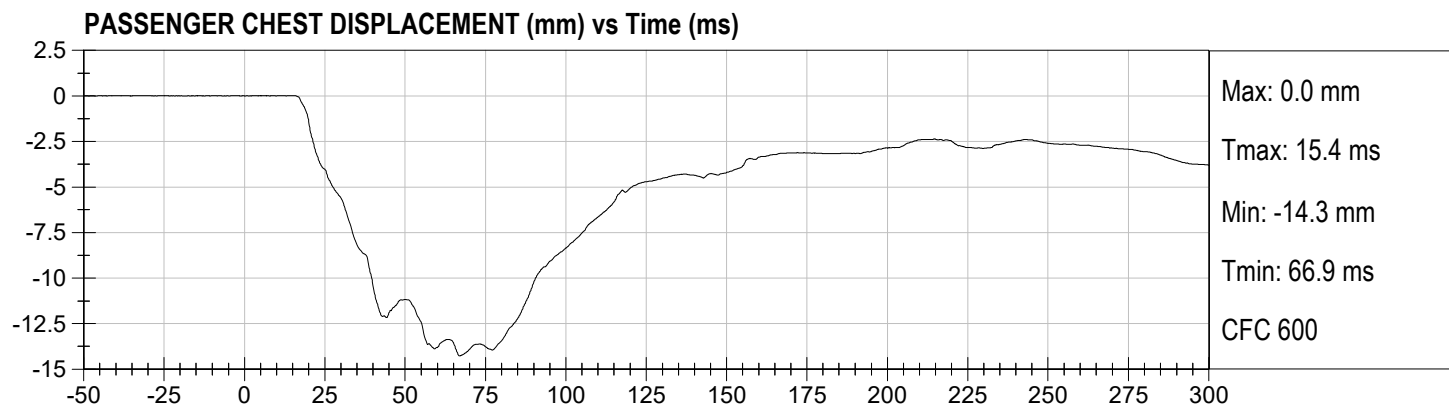


PASSENGER HEAD Z (g) vs Time (ms)

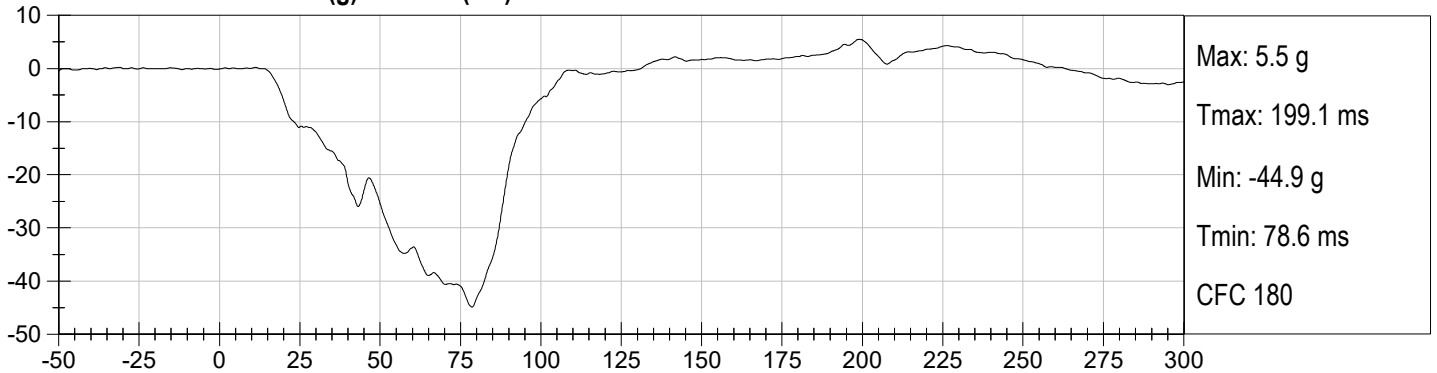


PASSENGER HEAD Resultant (g) vs Time (ms)

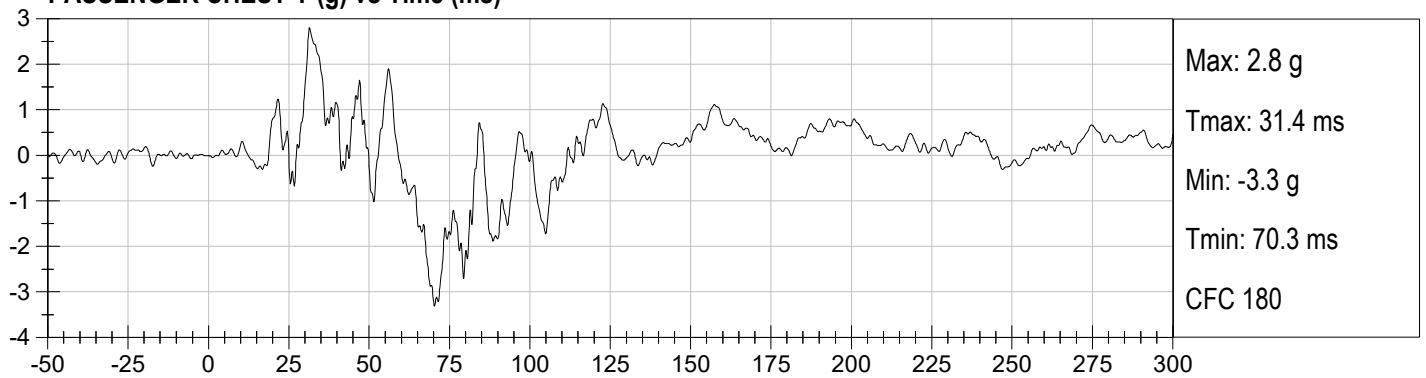




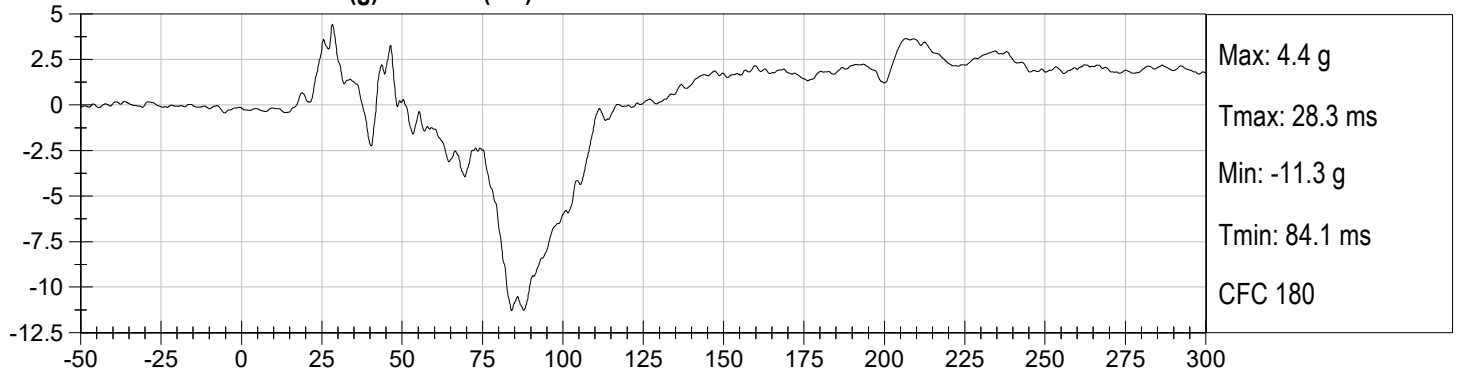
PASSENGER CHEST X (g) vs Time (ms)



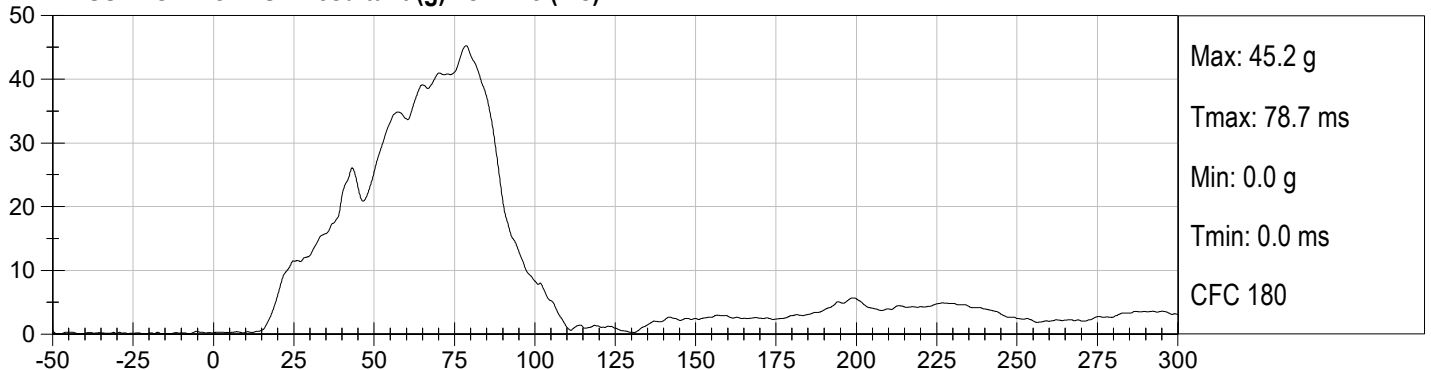
PASSENGER CHEST Y (g) vs Time (ms)



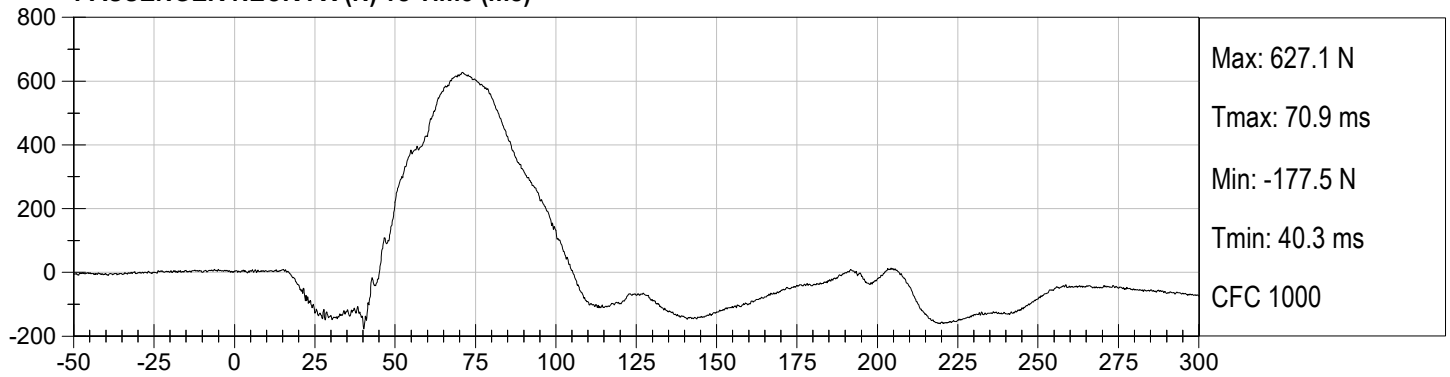
PASSENGER CHEST Z (g) vs Time (ms)



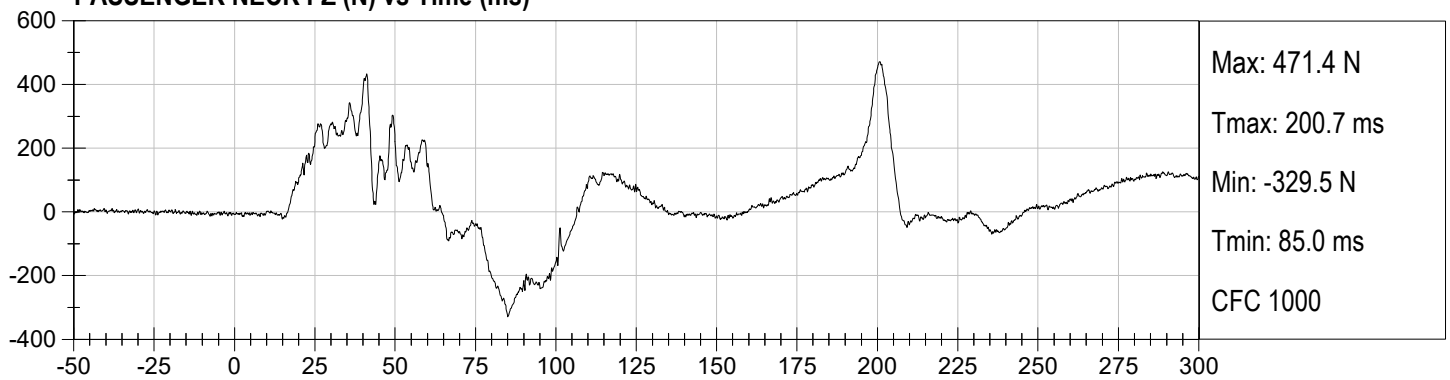
PASSENGER CHEST Resultant (g) vs Time (ms)



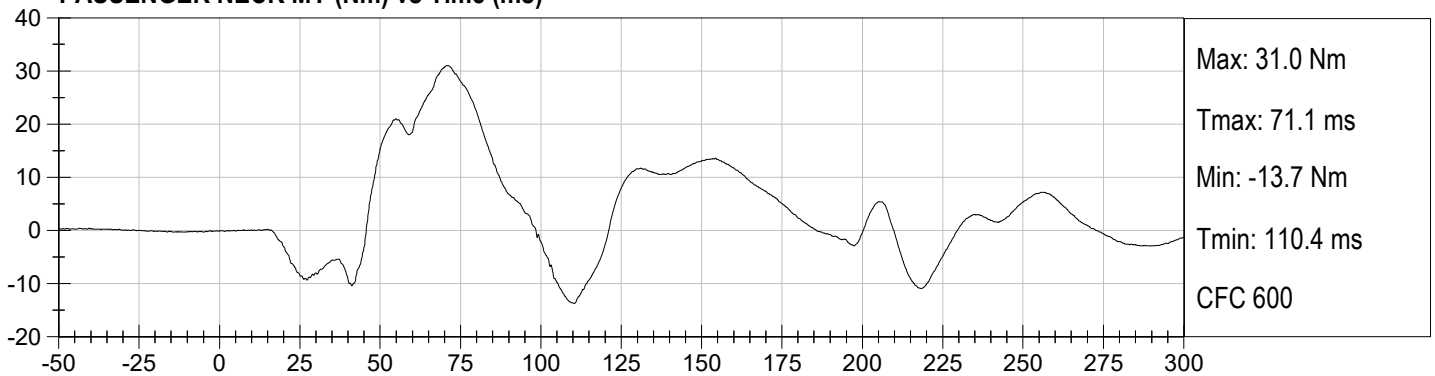
PASSENGER NECK FX (N) vs Time (ms)



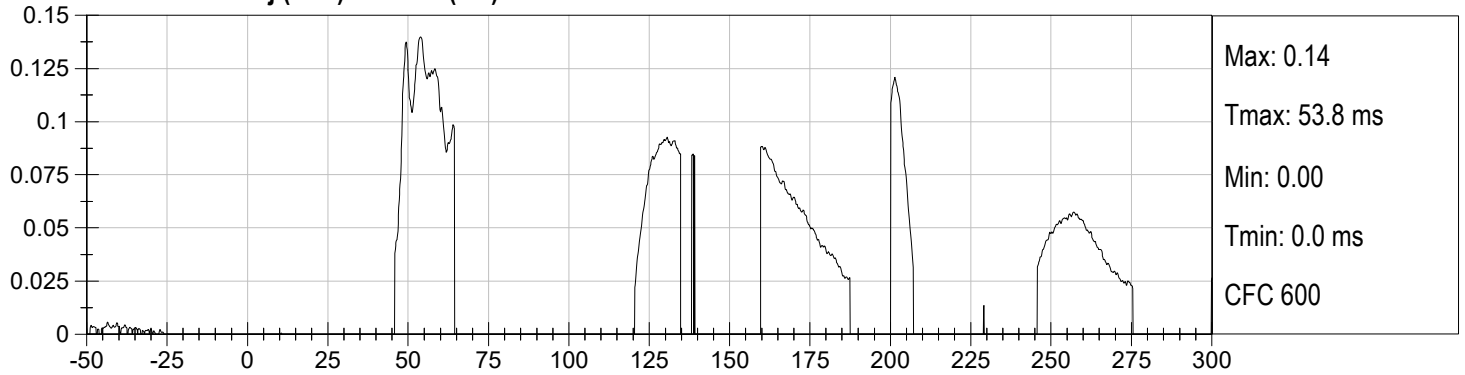
PASSENGER NECK FZ (N) vs Time (ms)



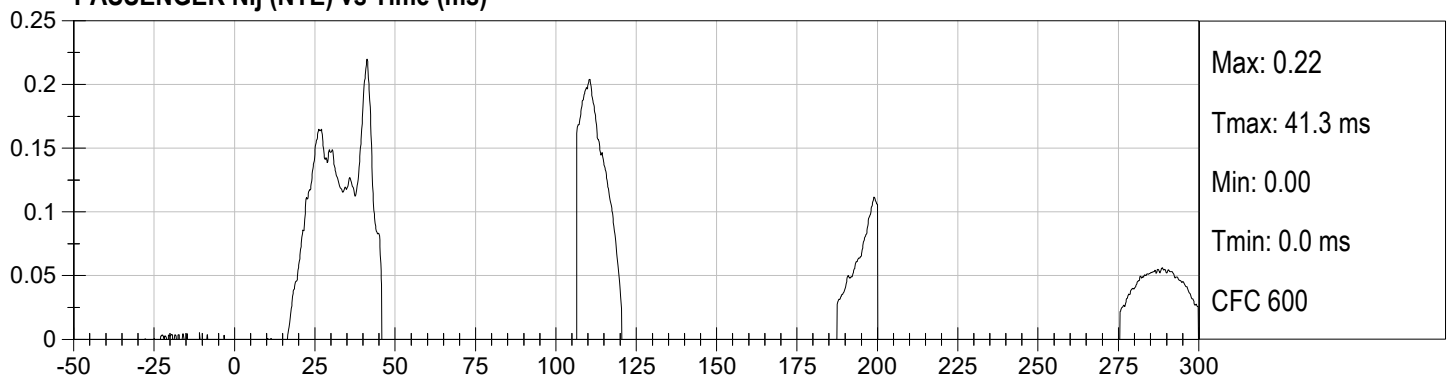
PASSENGER NECK MY (Nm) vs Time (ms)



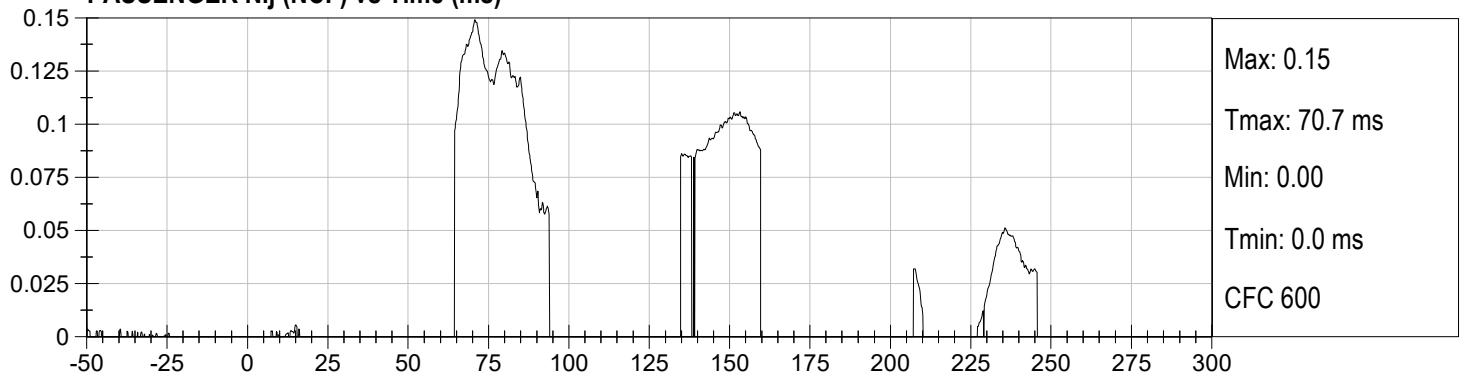
PASSENGER Nij (NTF) vs Time (ms)



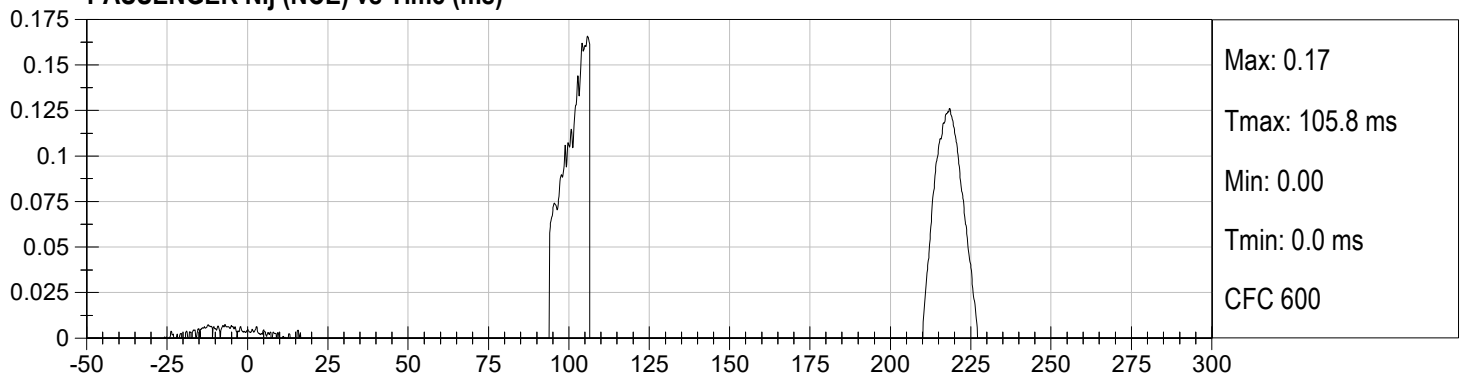
PASSENGER Nij (NTE) vs Time (ms)



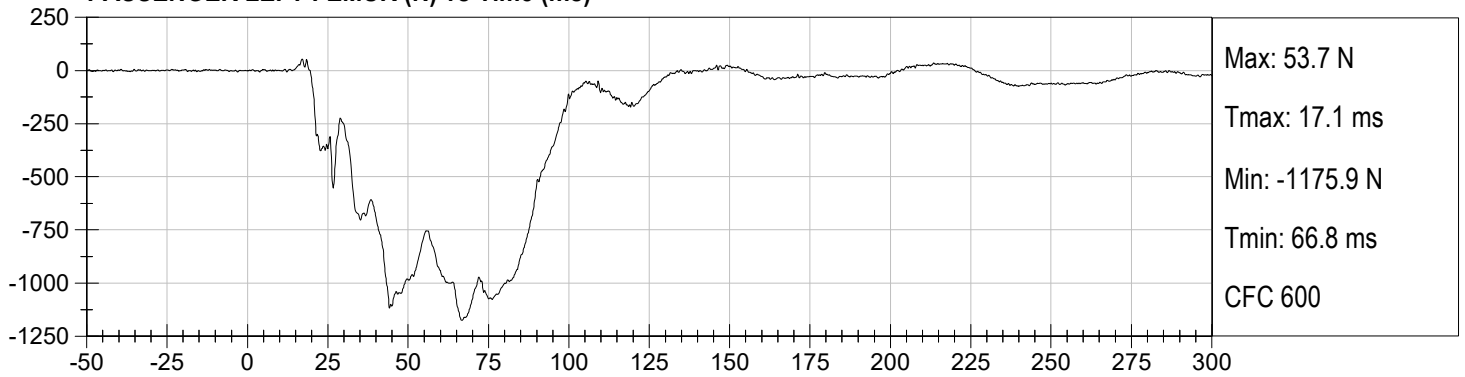
PASSENGER Nij (NCF) vs Time (ms)



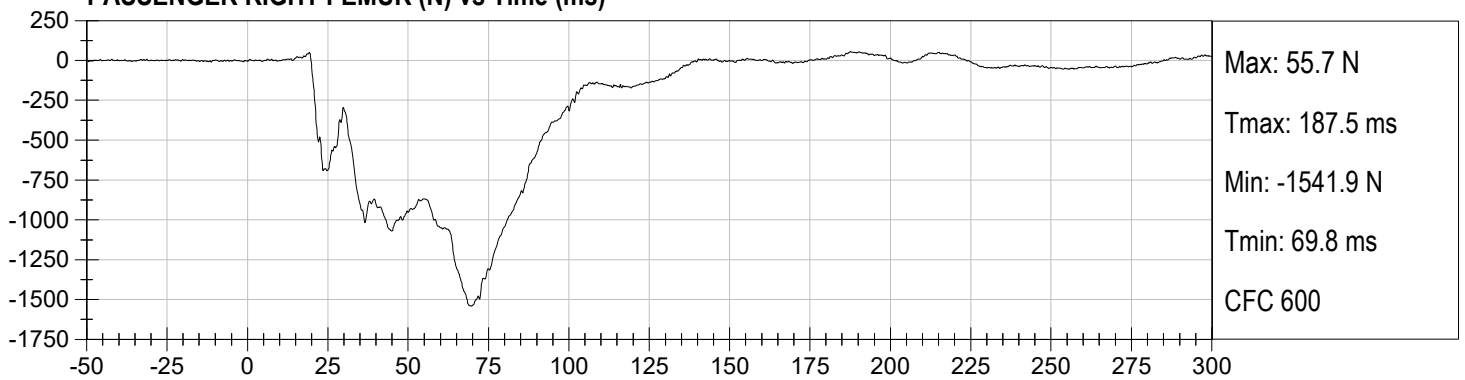
PASSENGER Nij (NCE) vs Time (ms)



PASSENGER LEFT FEMUR (N) vs Time (ms)



PASSENGER RIGHT FEMUR (N) vs Time (ms)



APPENDIX C
DUMMY QUALIFICATION AND PERFORMANCE VERIFICATION

QUALIFICATION TEST RESULTS

PRE-TEST

HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

Hybrid III, 50th External Measurements
SN: 351

HYBRID III, PART 572, SUBPART E EXTERNAL DIMENSIONS				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (inches)	ACTUAL MEASUREMENT
A	TOTAL SITTING HEIGHT	Seat surface to highest point on top of the head.	34.6–35.0	34.8
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	19.9-20.5	20.0
C	H-POINT HEIGHT	Reference	3.3-3.5	3.4
D	H-POINT LOCATION FROM BACKLINE	Reference	5.3-5.5	5.5
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	3.3-3.7	3.5
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	5.5-6.1	6.0
G	BACK OF ELBOW TO WRIST PIVOT	back of the elbow flesh to the wrist pivot in line with the elbow and wrist pivots	11.4-12.0	11.8
H	HEAD BACK TO BACKLINE	Back of Skull cap skin to seat rear vertical surface (Reference)	1.6-1.8	1.7
I	SHOULDER TO- ELBOW LENGTH	Measure from the highest point on top of the shoulder clevis to the lowest part of the flesh on the elbow in line with the elbow pivot bolt.	13.0-13.6	13.3
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	7.5-8.3	7.8
K	BUTTOCK TO KNEE LENGTH	The forward most part of the knee flesh to the rear vertical surface of the fixture.	22.8-23.8	23.8
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	16.9-17.9	17.0
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	19.1-19.7	19.5
N	BUTTOCK POPLITEAL LENGTH	The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. "K".	17.8-18.8	18.8

HYBRID III, SUBPART E EXTERIOR DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS		ACTUAL MEASUREMENT
O	CHEST DEPTH WITHOUT JACKET	Measured 16.9-17.1 in. above seat surface	8.4-9.0	8.5
P	FOOT LENGTH	Tip of toe to rear of heel	9.9-10.5	10.3
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	16.3-17.2	16.5
W	FOOT BREADTH	The widest part of the foot	3.6-4.2	4.0
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 16.9-17.1 in. above seat surface	38.2-39.4	39.2
Z	WAIST CIRCUMFERENCE	Measured 8.9-9.1 in. above seat surface	32.9-34.1	33.7
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	16.9-17.1	17.0
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	8.9-9.1	9.0

NOTE: THE H-POINT IS LOCATED 1.83 INCHES FORWARD AND 2.57 INCHES DOWN FROM THE CENTER OF THE PELVIS ANGLE REFERENCE HOLE.

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 50TH PERCENTILE MALE

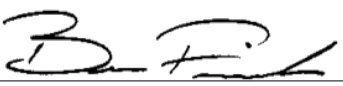
ATD Serial No: 351

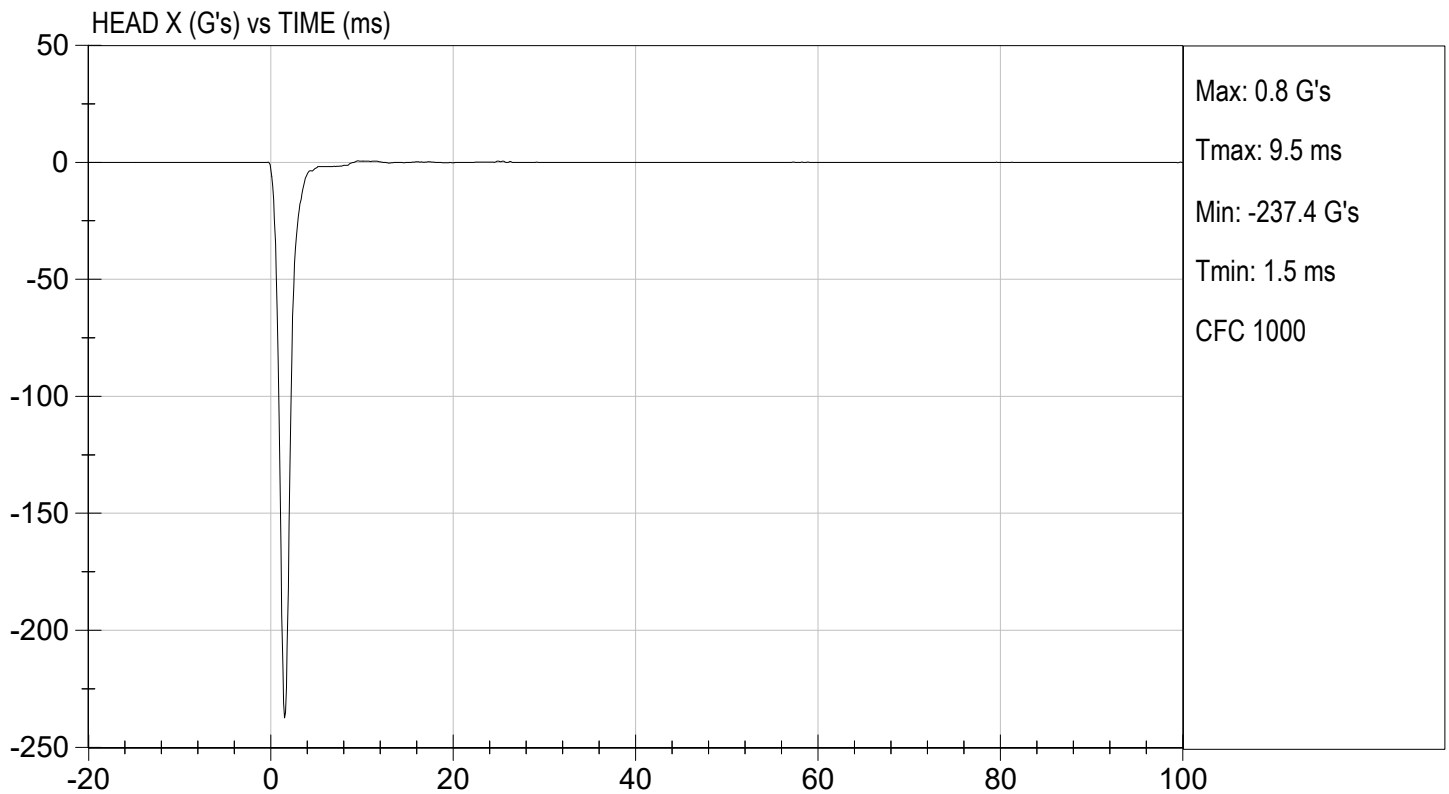
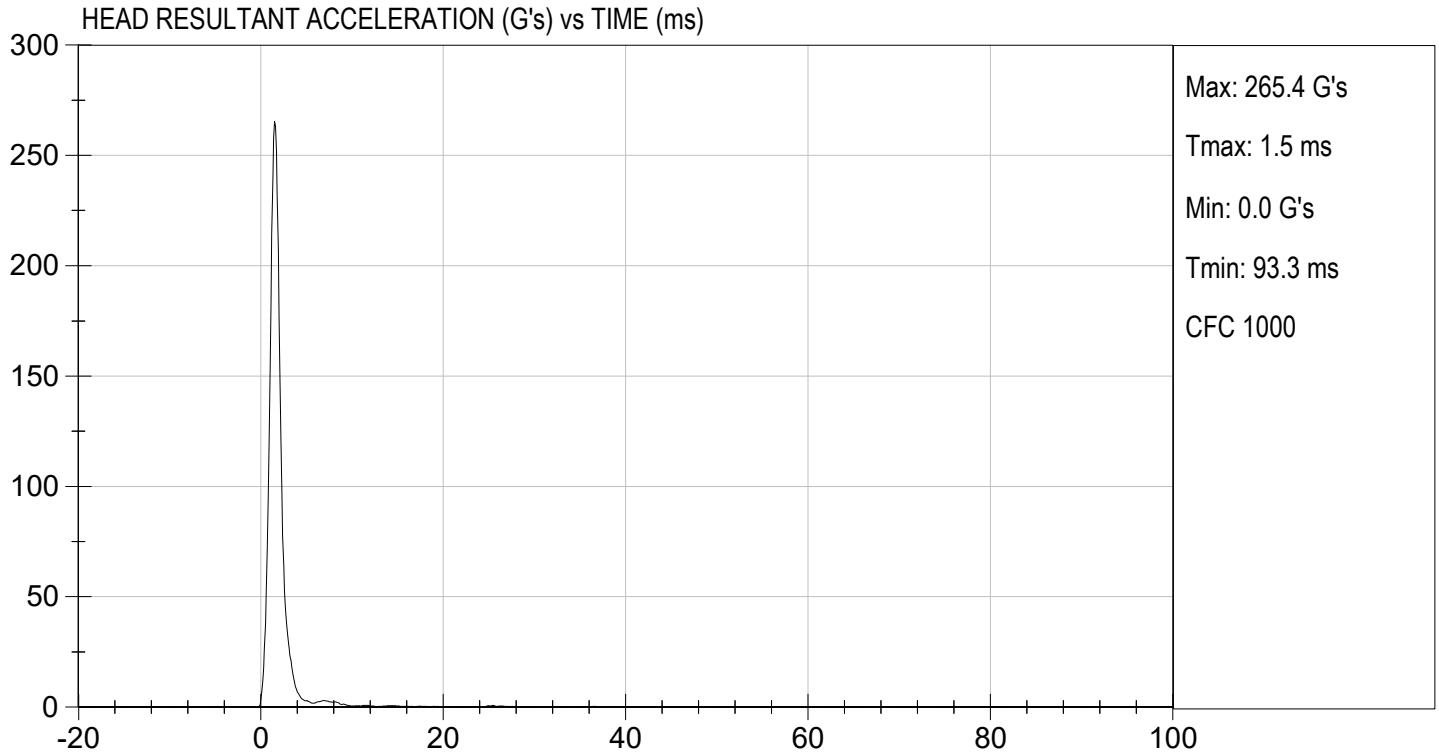
Test ID: D230621

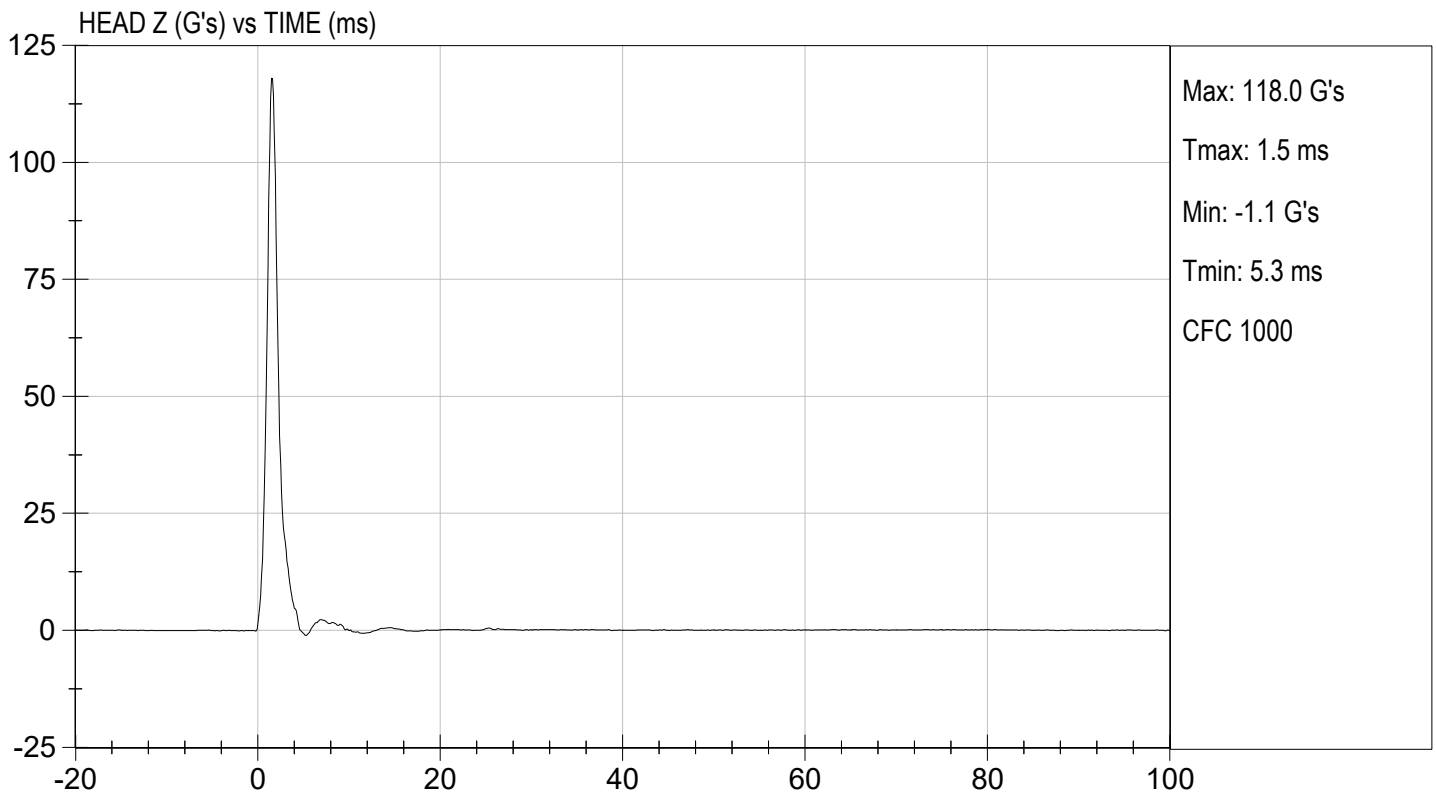
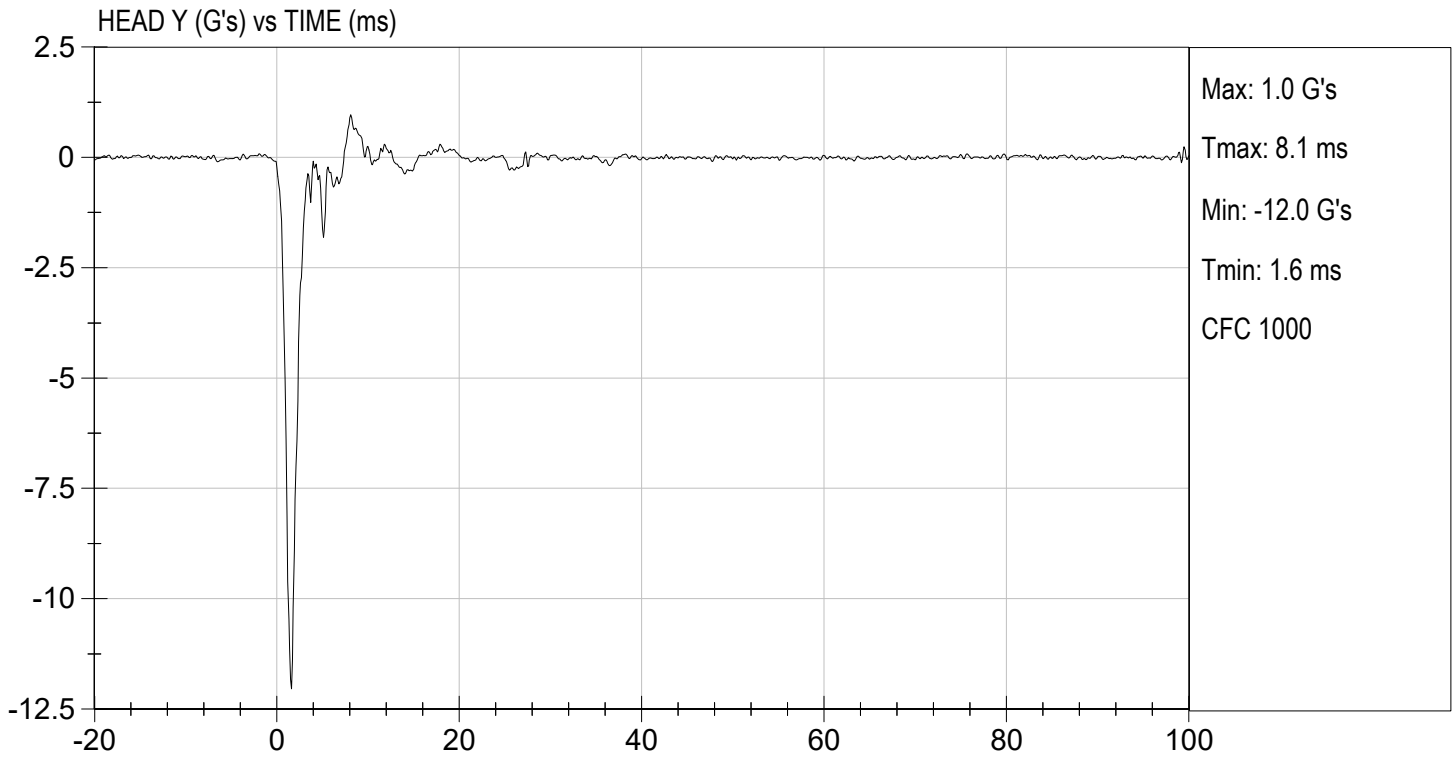
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Peak Resultant Acceleration	G's	225 to 275	265	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-12.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

03/13/2023
Test Date


Approved By





MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

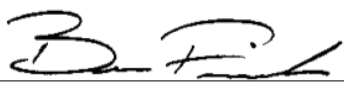
Test I.D: D230622

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	25	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.52	Pass
	20 ms	G's	17.60 to 22.60	19.93	Pass
	30 ms	G's	12.50 to 18.50	15.89	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	15.8	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	36.5	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	71.1	Pass
	Time	ms	57.0 to 64.0	59.4	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	116.5	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	95.3	Pass
	Time	ms	47.0 to 58.0	48.3	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	98.5	Pass
Overall Test Results					Pass


 Laboratory Technician

03/13/2023

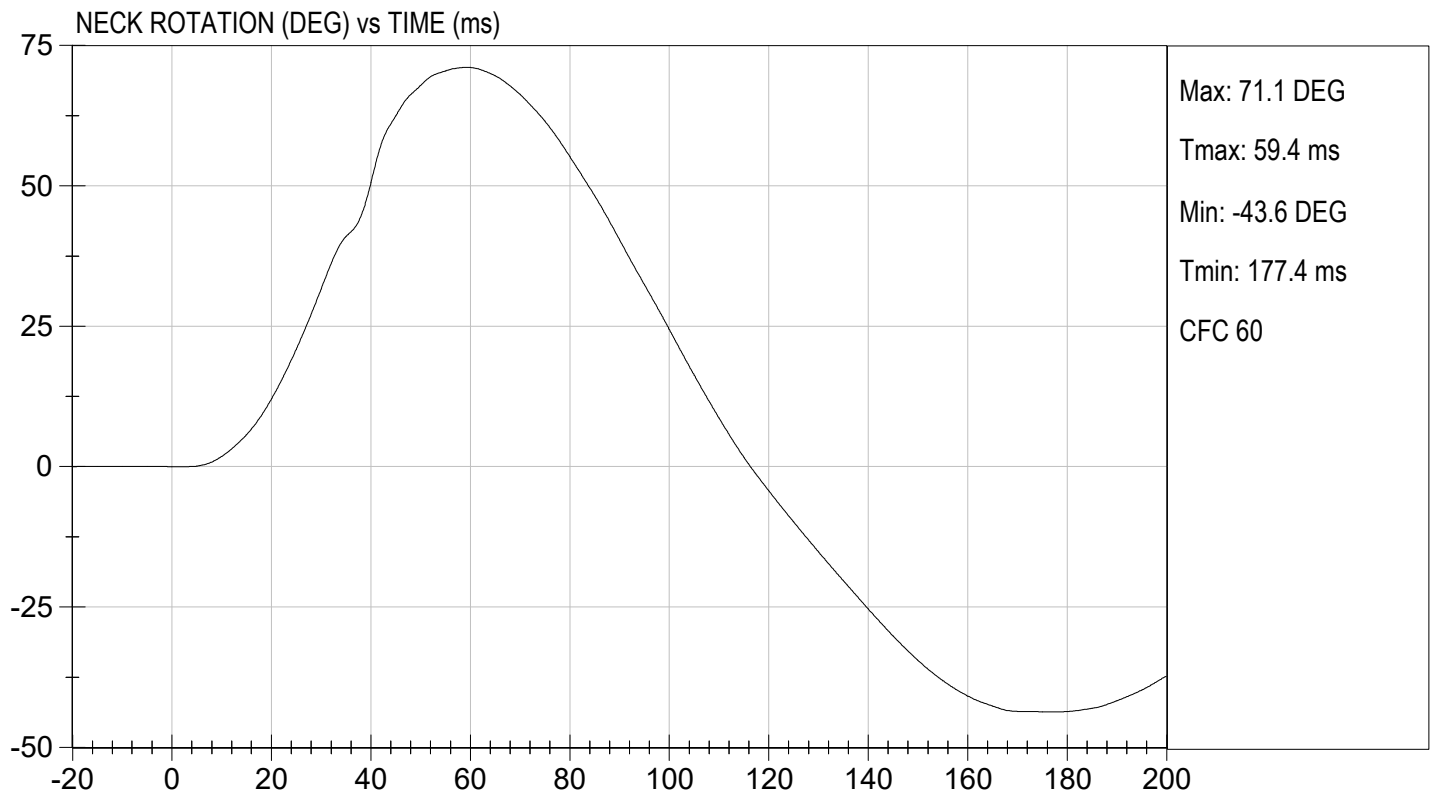
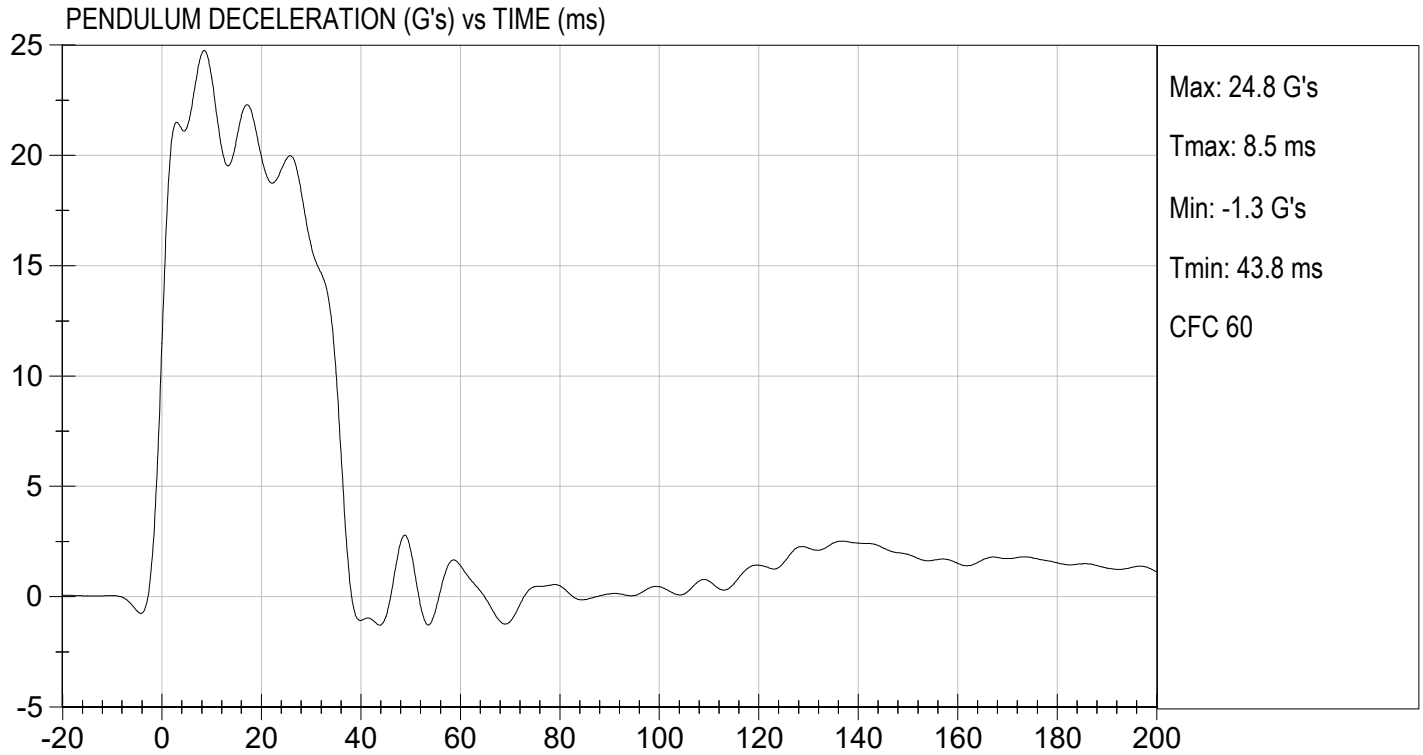
Test Date


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TEST DESC: NECK FLEXION
VELOCITY: 22.83 ft/s, 6.96 m/s

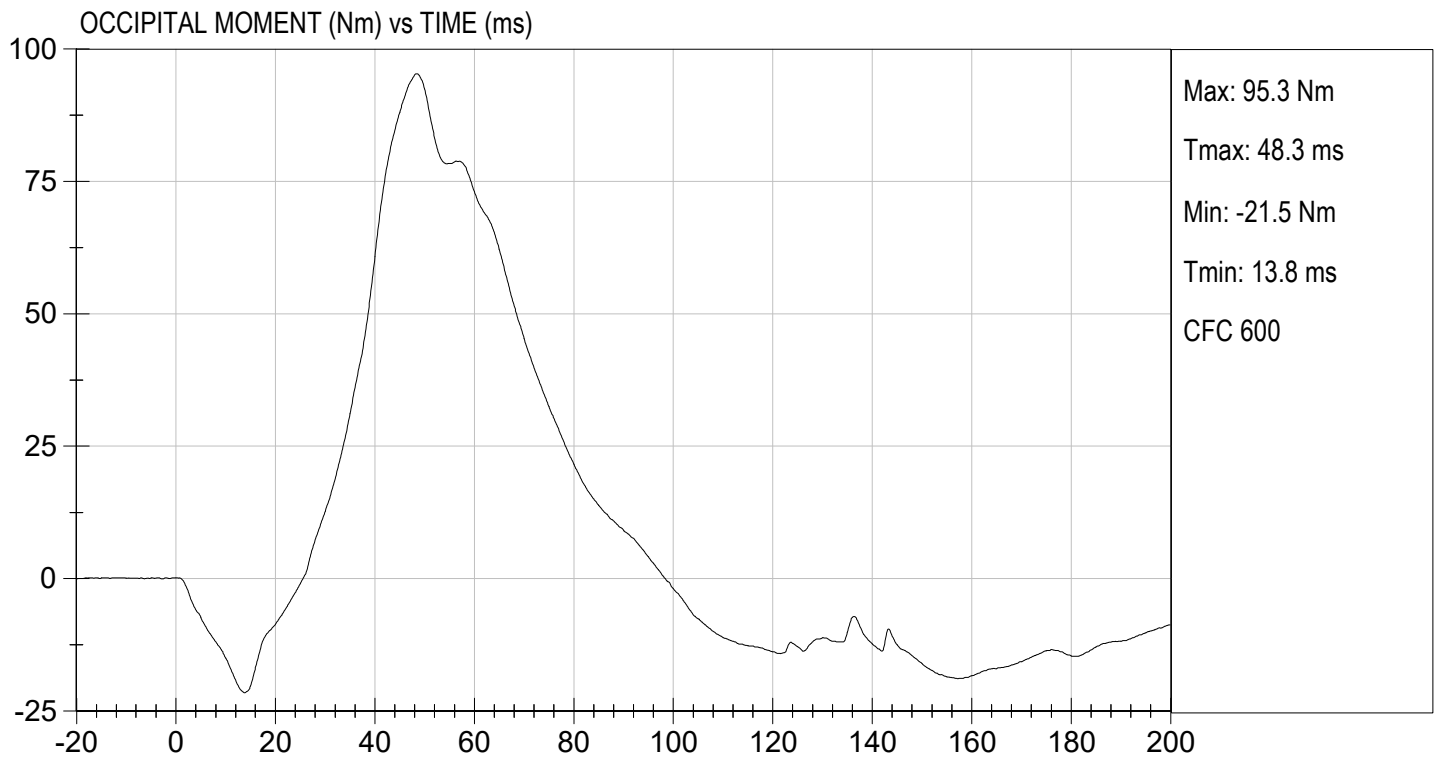
TEST DATE: 03/13/2023
TEST #: D230622





TEST DESC: NECK FLEXION
VELOCITY: 22.83 ft/s, 6.96 m/s

TEST DATE: 03/13/2023
TEST #: D230622



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

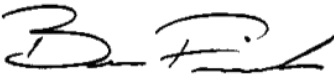
Test I.D: D230623

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	25	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.05	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	19.12	Pass
	20 ms	G's	14.00 to 19.00	15.62	Pass
	30 ms	G's	11.00 to 16.00	13.56	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	14.2	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	39.9	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	95.6	Pass
	Time	ms	72.0 to 82.0	76.5	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	157.7	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-62.7	Pass
	Time	ms	65.0 to 79.0	71.5	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	140.1	Pass
Overall Test Results					Pass


 Laboratory Technician

03/13/2023

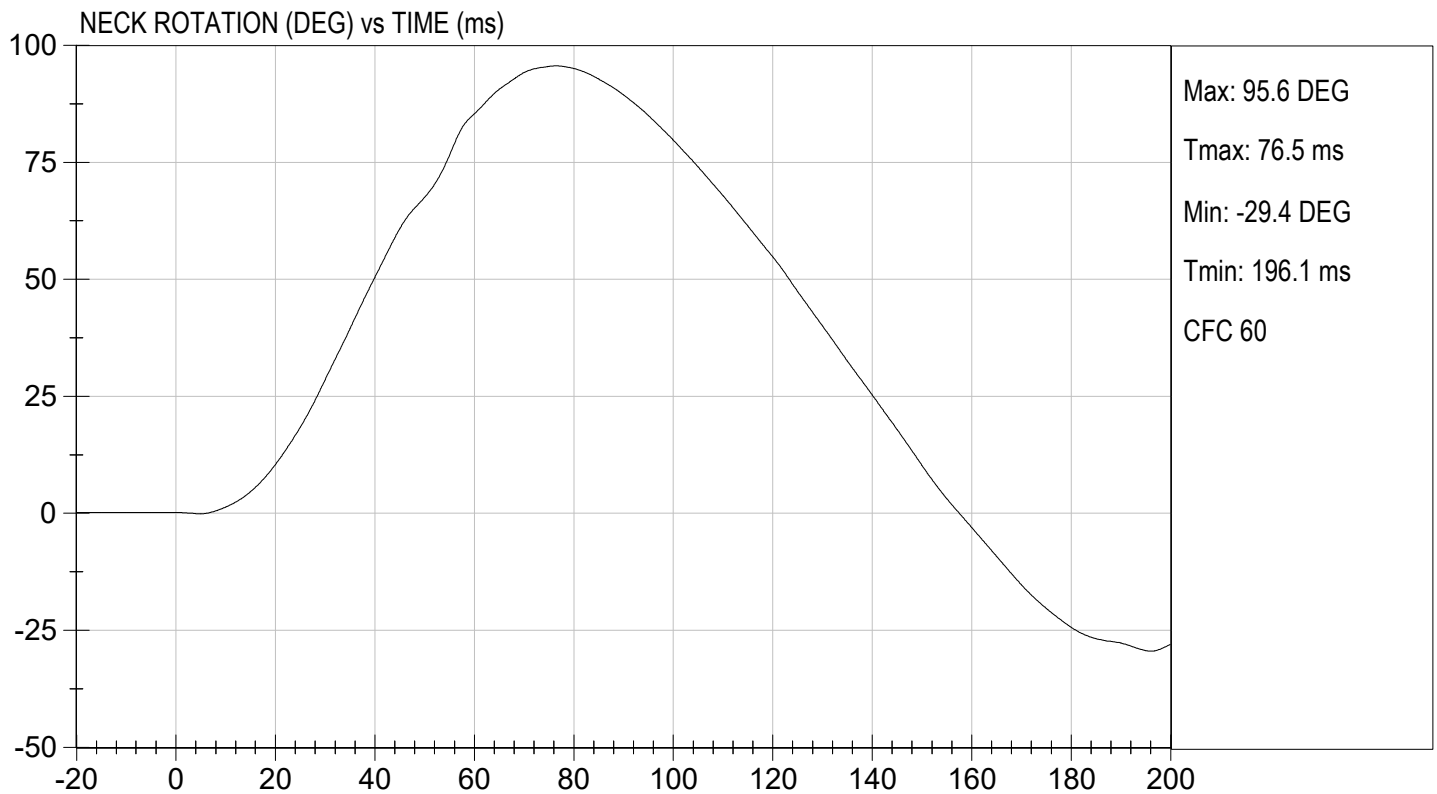
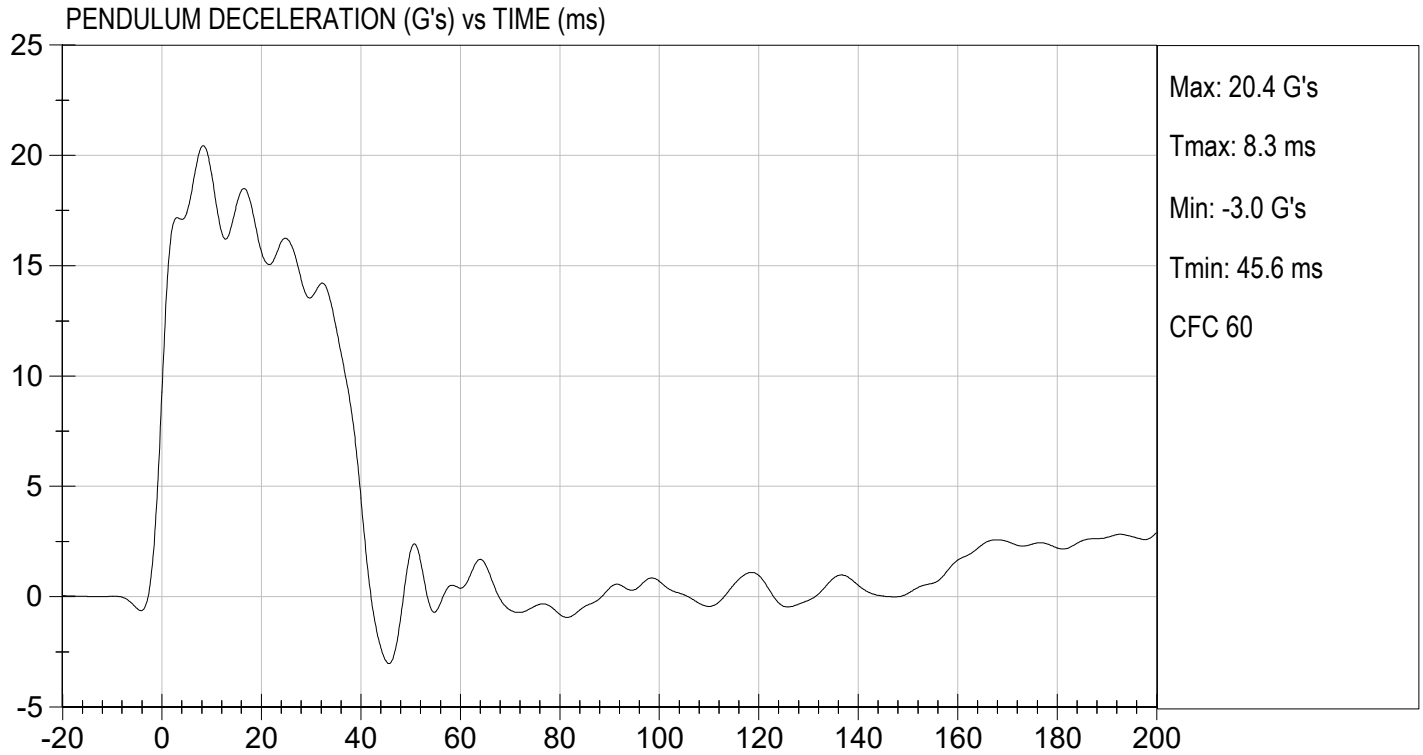
Test Date


 Approved By



TEST DESC: NECK EXTENSION
VELOCITY: 19.84 ft/s, 6.05 m/s

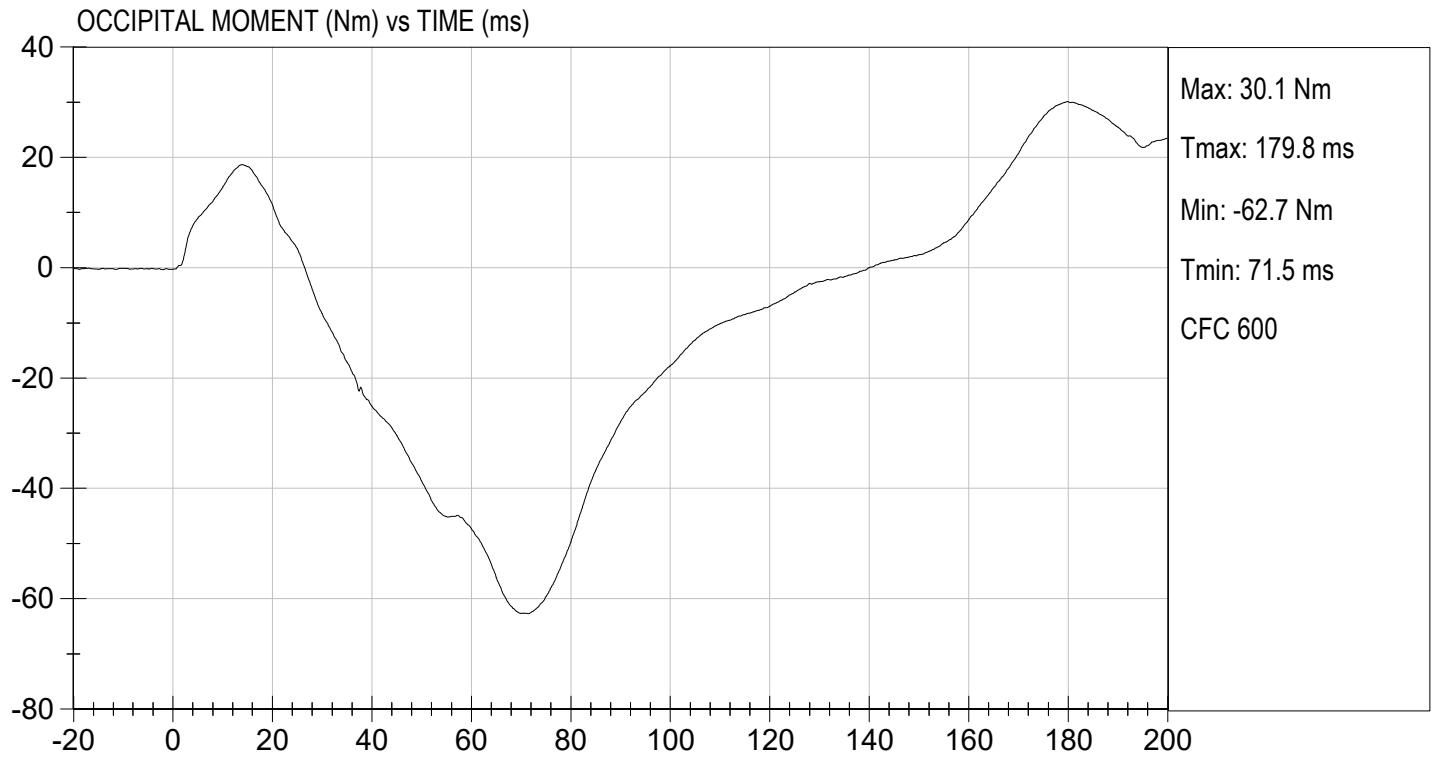
TEST DATE: 03/13/2023
TEST #: D230623





TEST DESC: NECK EXTENSION
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 03/13/2023
TEST #: D230623



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

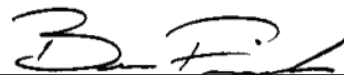
ATD Serial No: 351

Test I.D: D230624

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	24	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,711	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.69	Pass
Internal Hysteresis	%	69 to 85	72	Pass
Overall Test Results			Pass	


Laboratory Technician

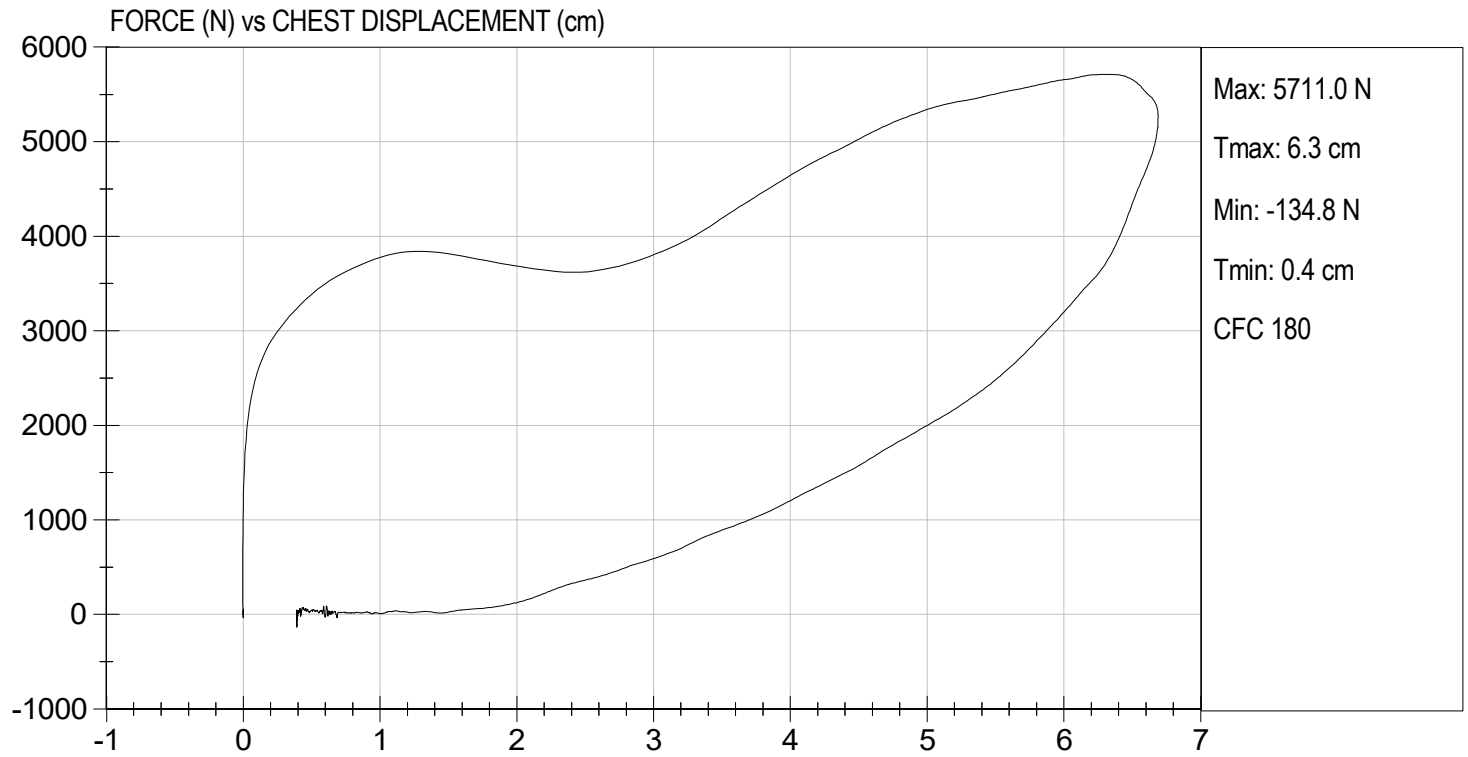
03/13/2023
Test Date


Approved By



TEST DESC: THORAX IMPACT
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 03/13/2023
TEST #: D230624



MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

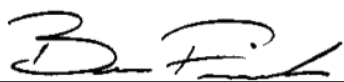
ATD Serial No: 351

Test I.D: D230625

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	N	4715 to 5782	5,614	Pass
Overall Test Results				Pass


Laboratory Technician

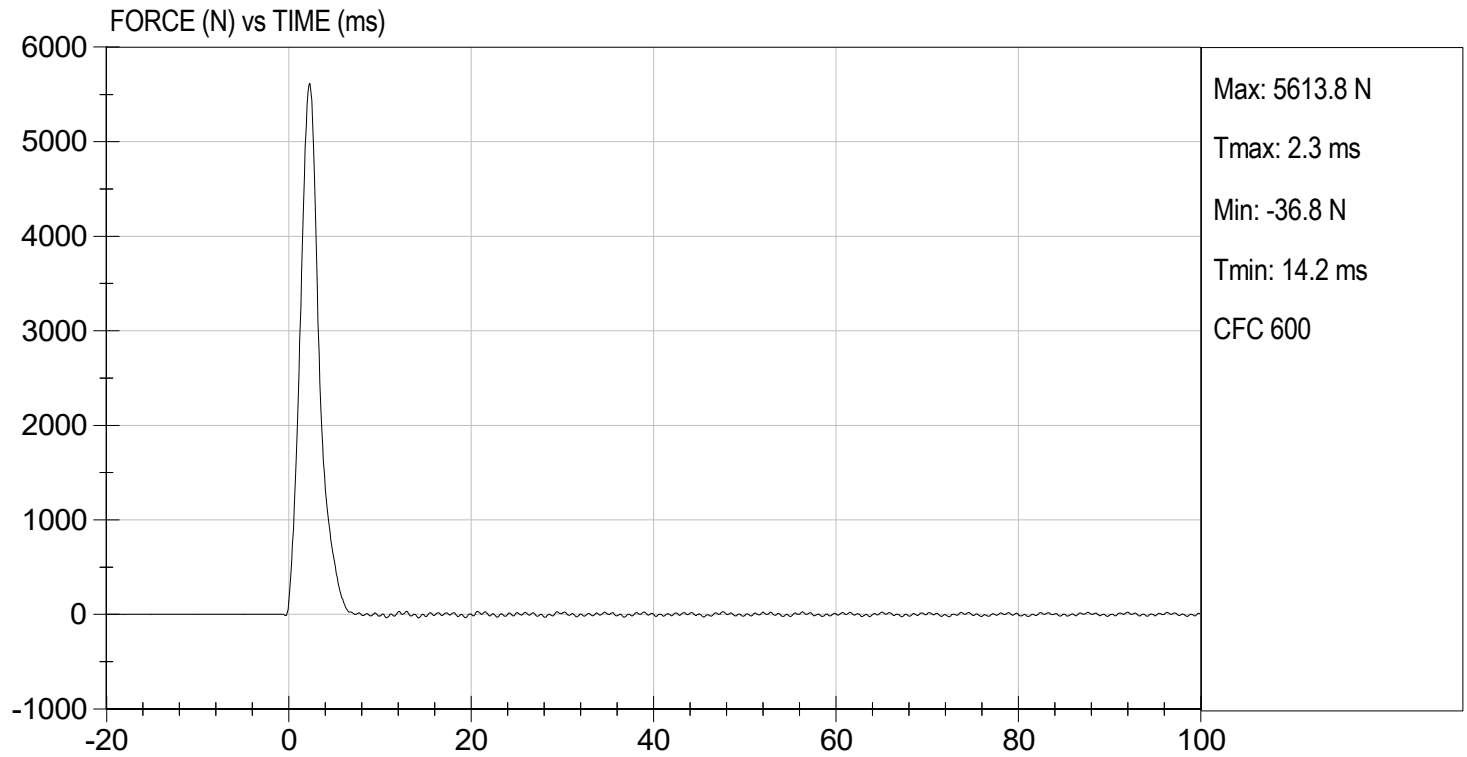
03/13/2023
Test Date


Approved By



TEST DESC: RIGHT KNEE
VELOCITY: 6.89 ft/s, 2.10 m/s

TEST DATE: 03/13/2023
TEST #: D230625



MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

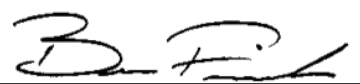
ATD Serial No: 351

Test I.D: D230626

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Probe Velocity	m/s	2.07 to 2.13	2.09	Pass
Peak Probe Force	N	4715 to 5782	5,326	Pass
Overall Test Results				Pass


Laboratory Technician

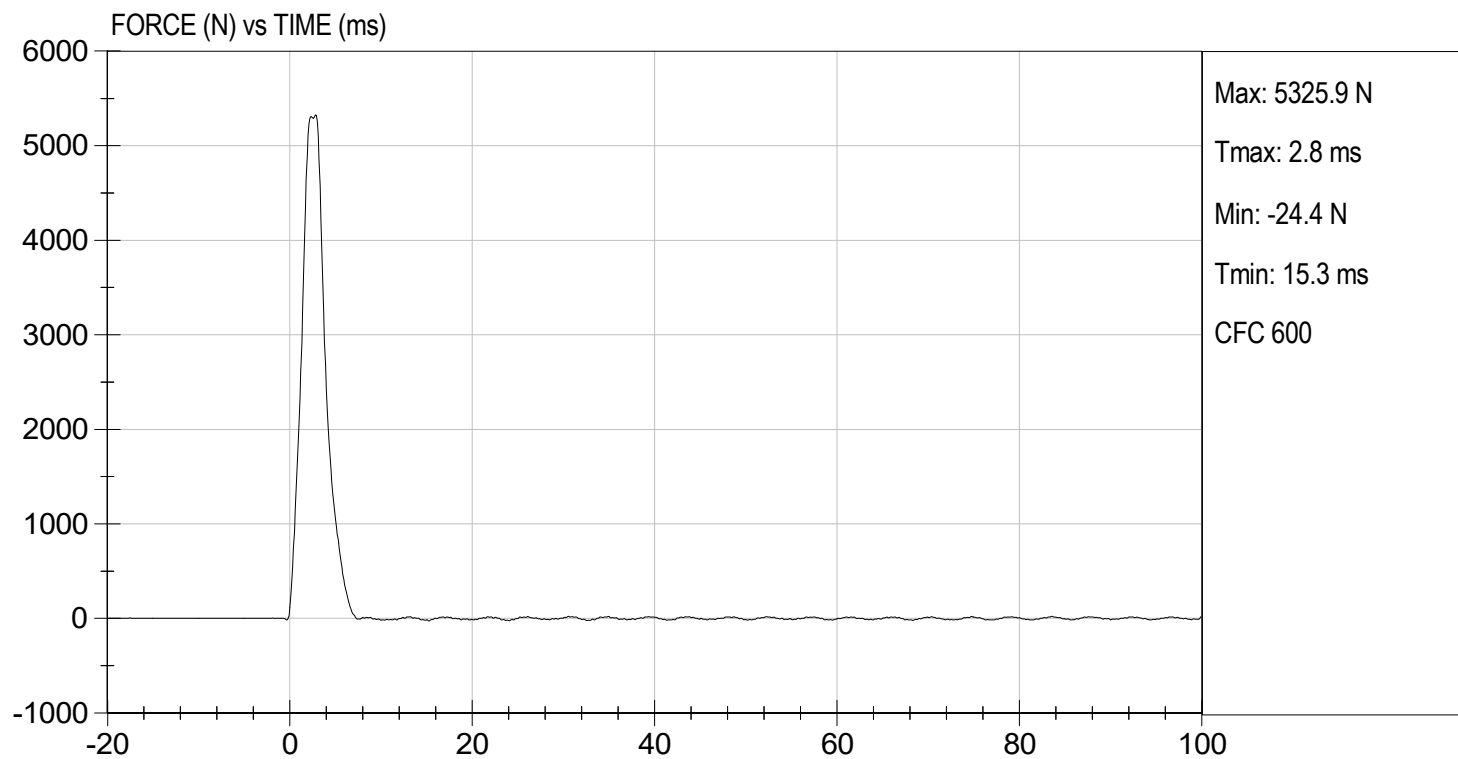
03/13/2023
Test Date


Approved By



TEST DESC: LEFT KNEE
VELOCITY: 6.86 ft/s, 2.09 m/s

TEST DATE: 03/13/2023
TEST #: D230626



MGA RESEARCH CORPORATION
HIP-FEMUR FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

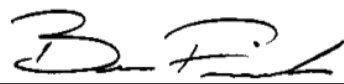
ATD Serial No: 351

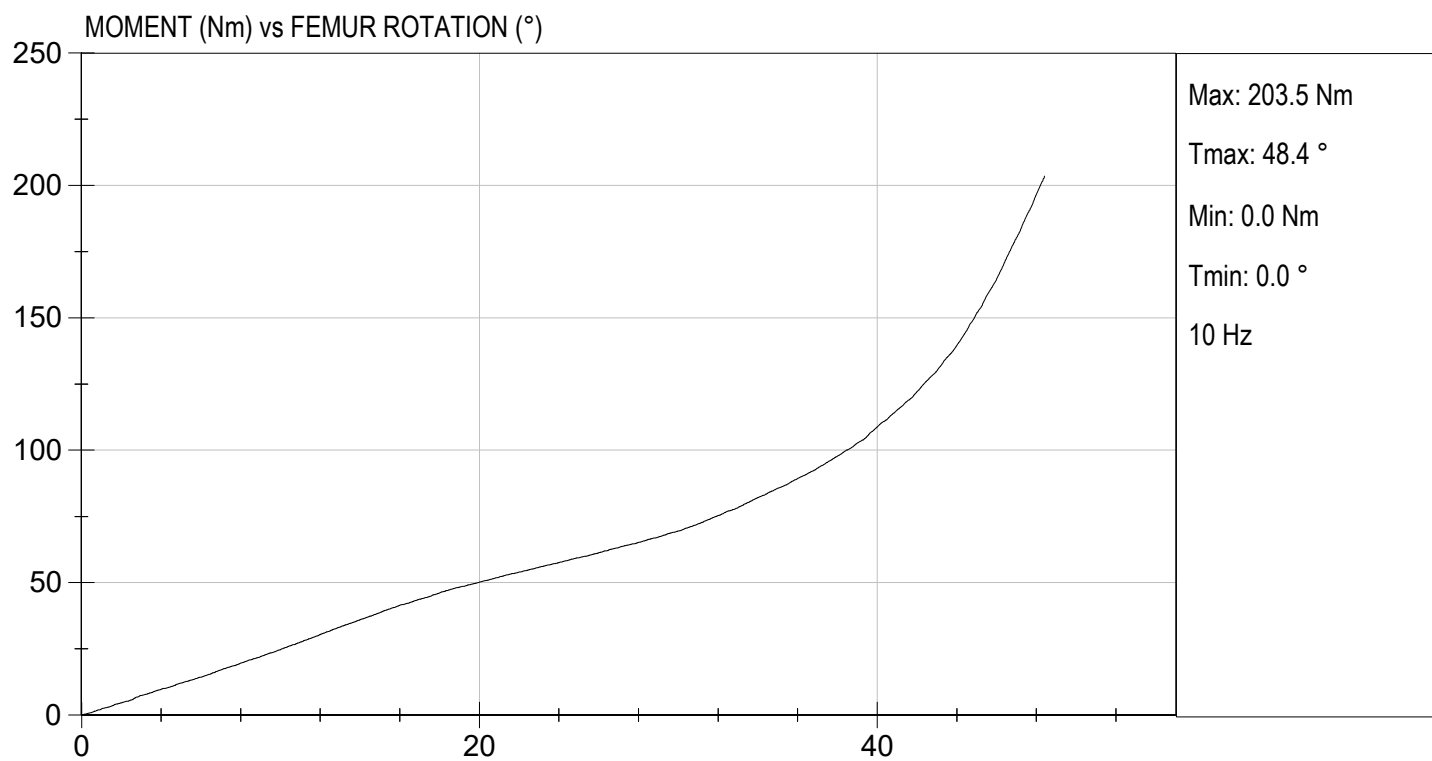
Test I.D: D230620

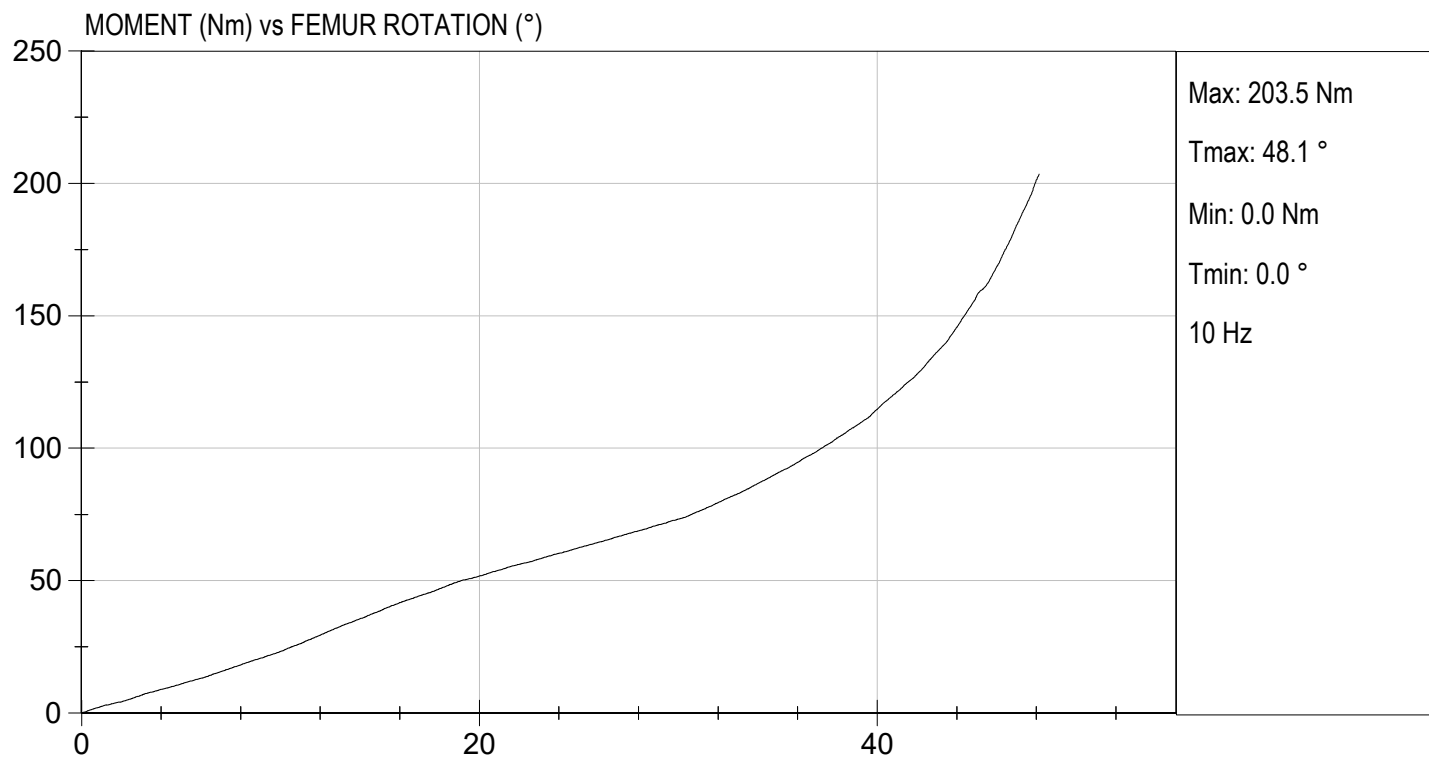
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.8	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	25	25	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.5	6.5	Pass
30 Degrees	Nm	94.9 Nm Max	69.5	73.3	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	48.4	48.1	Pass
Overall Test Results					Pass


 Laboratory Technician

03/13/2023
 Test Date


 Approved By





QUALIFICATION TEST RESULTS

POST-TEST

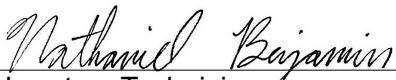
HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

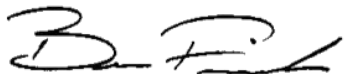
Test ID: D230821

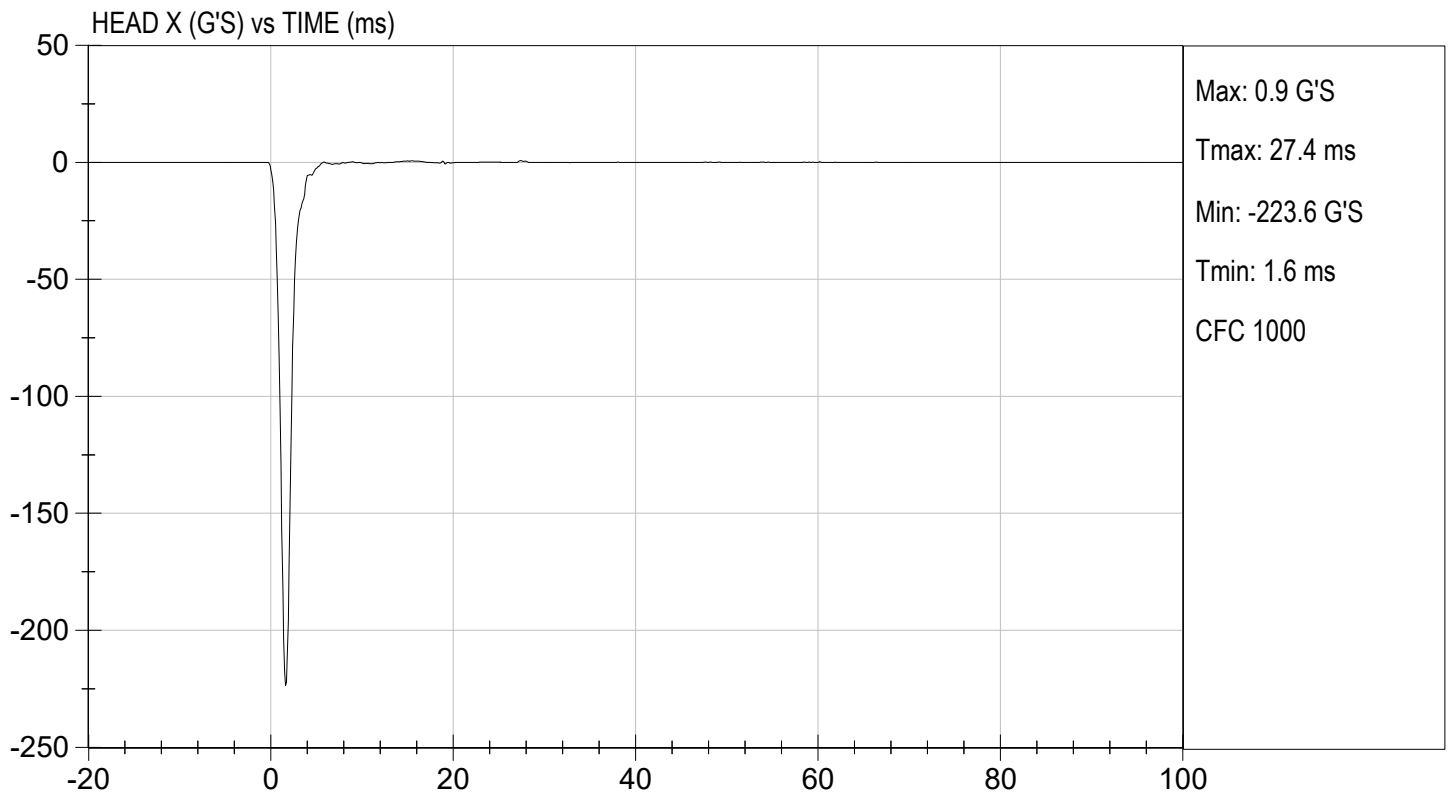
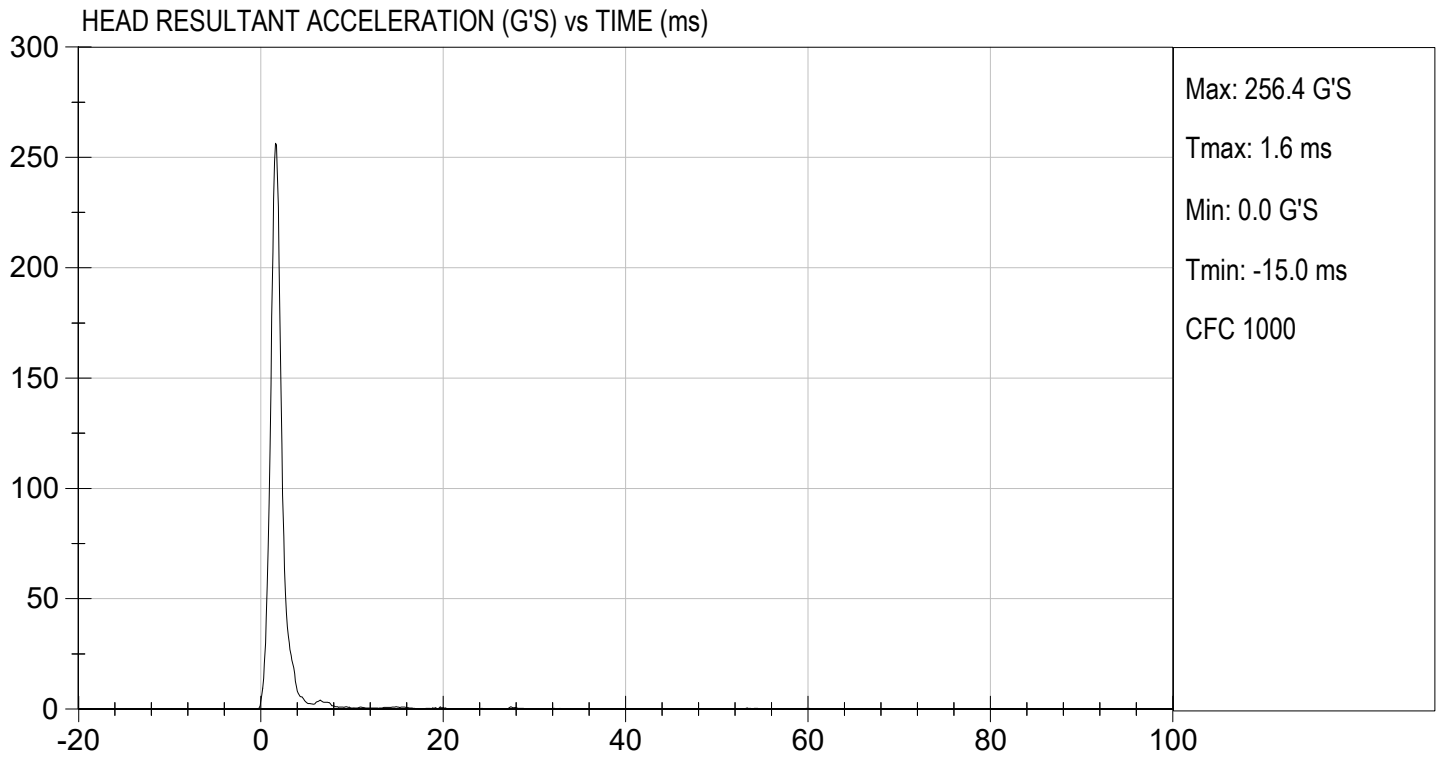
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Peak Resultant Acceleration	G's	225 to 275	256	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-2.3	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

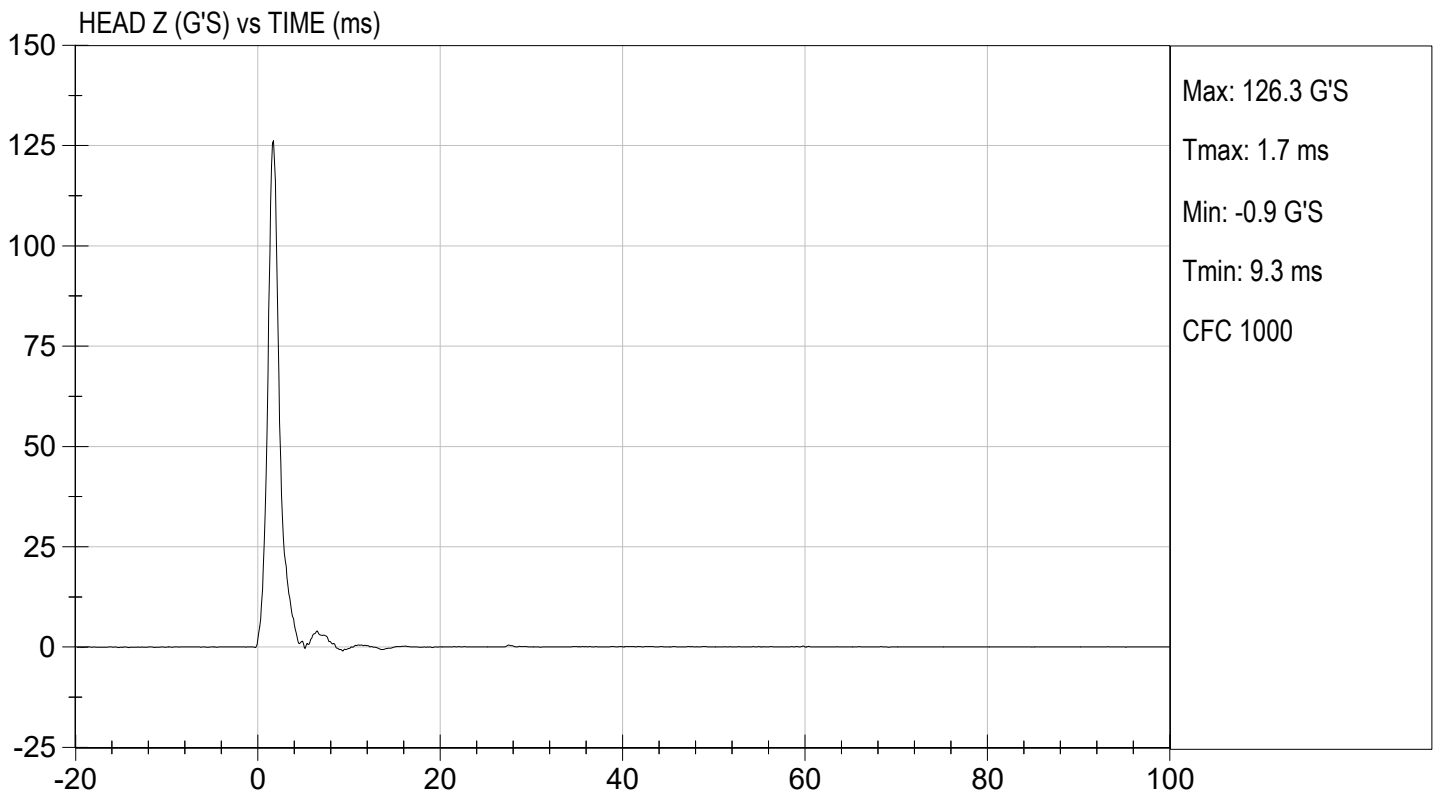
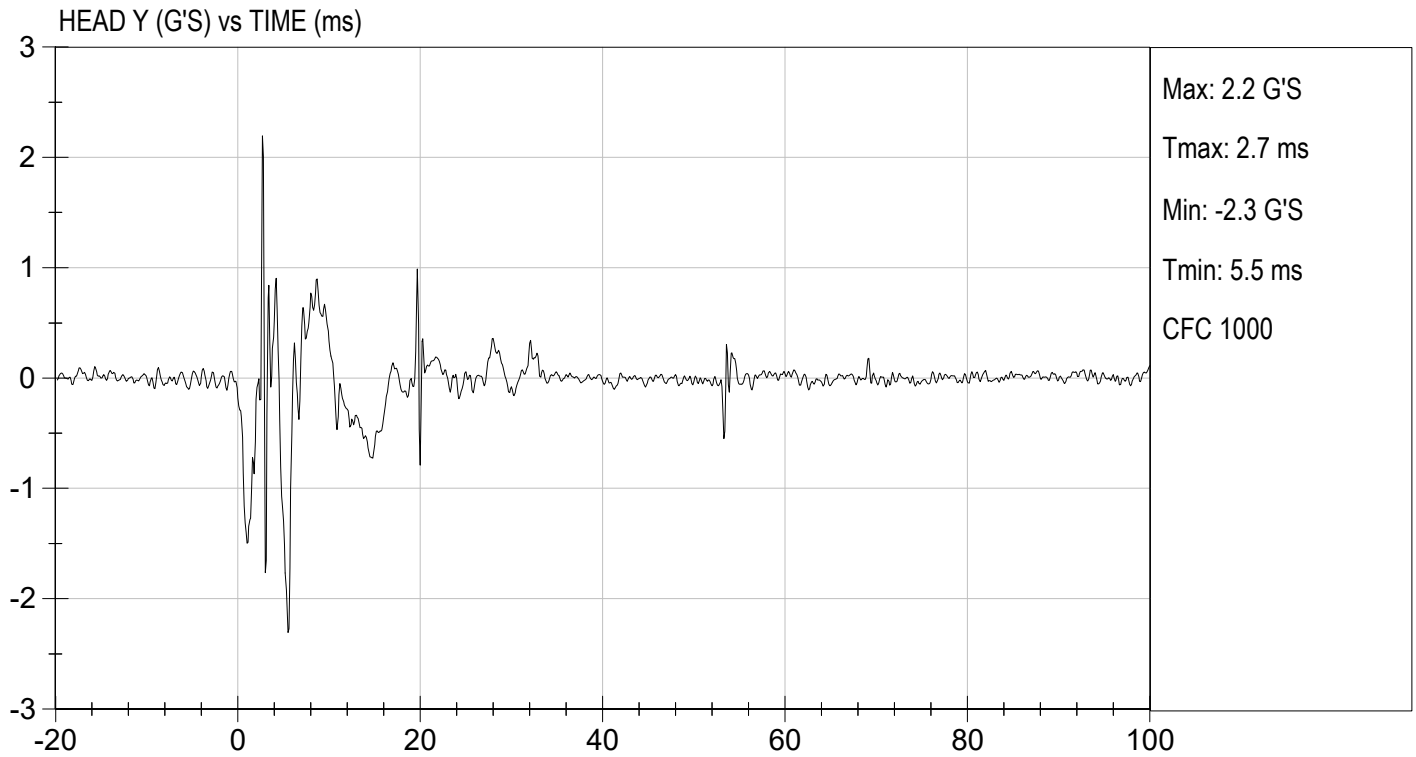

Laboratory Technician

03/30/2023

Test Date


Approved By



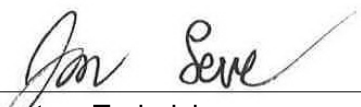


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

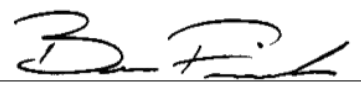
Test I.D: D230822

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	43	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.81	Pass
	20 ms	G's	17.60 to 22.60	20.09	Pass
	30 ms	G's	12.50 to 18.50	15.14	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	15.5	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	36.7	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	70.3	Pass
	Time	ms	57.0 to 64.0	59.2	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	115.9	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	96.8	Pass
	Time	ms	47.0 to 58.0	48.5	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	100.8	Pass
Overall Test Results					Pass


 Laboratory Technician

03/31/2023

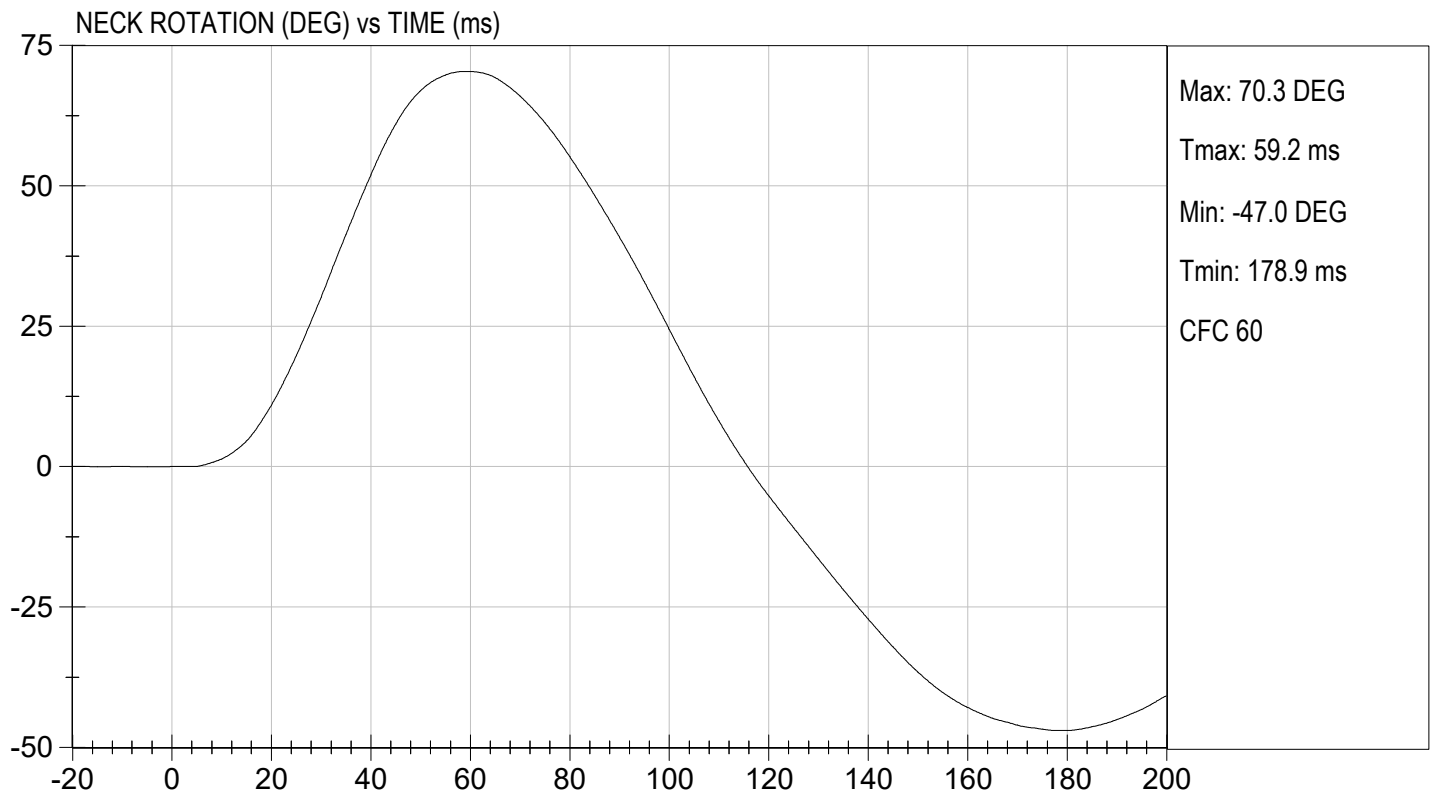
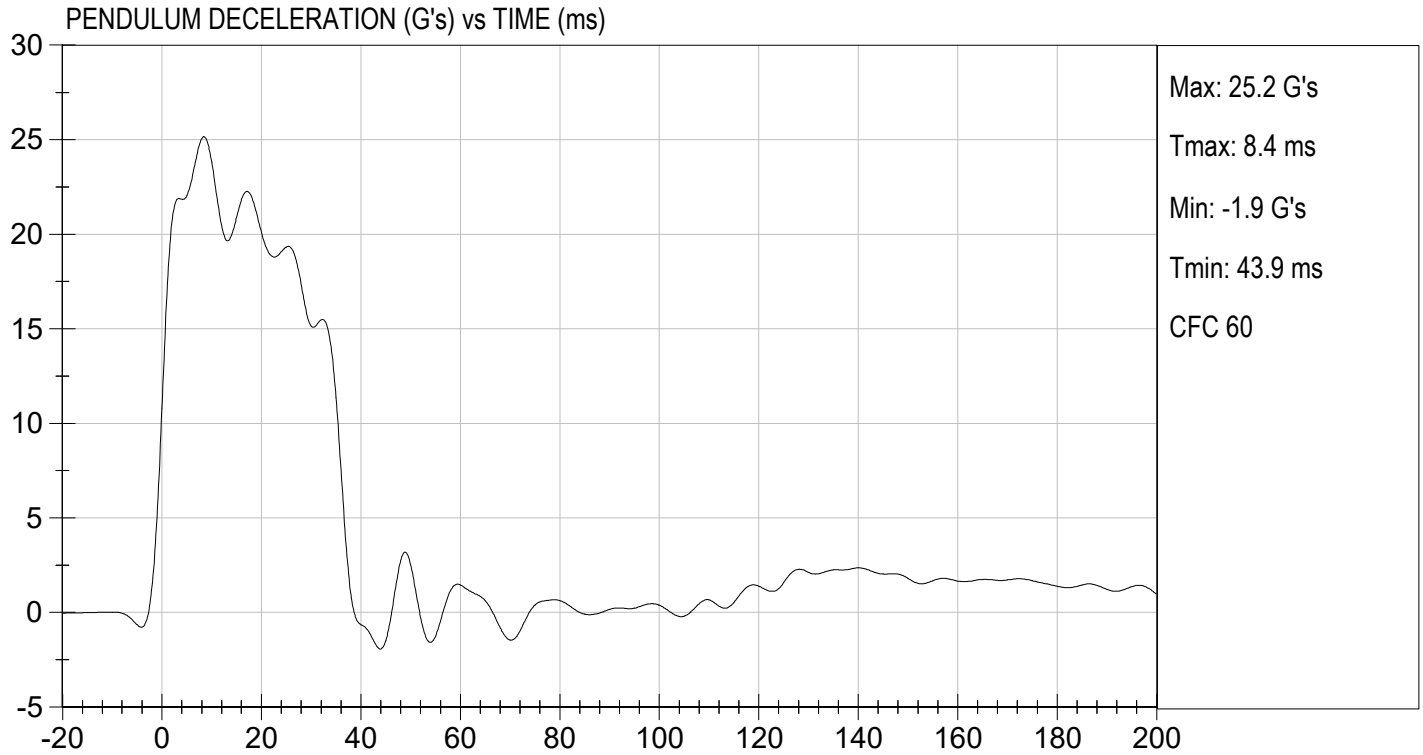
Test Date


 Approved By



TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

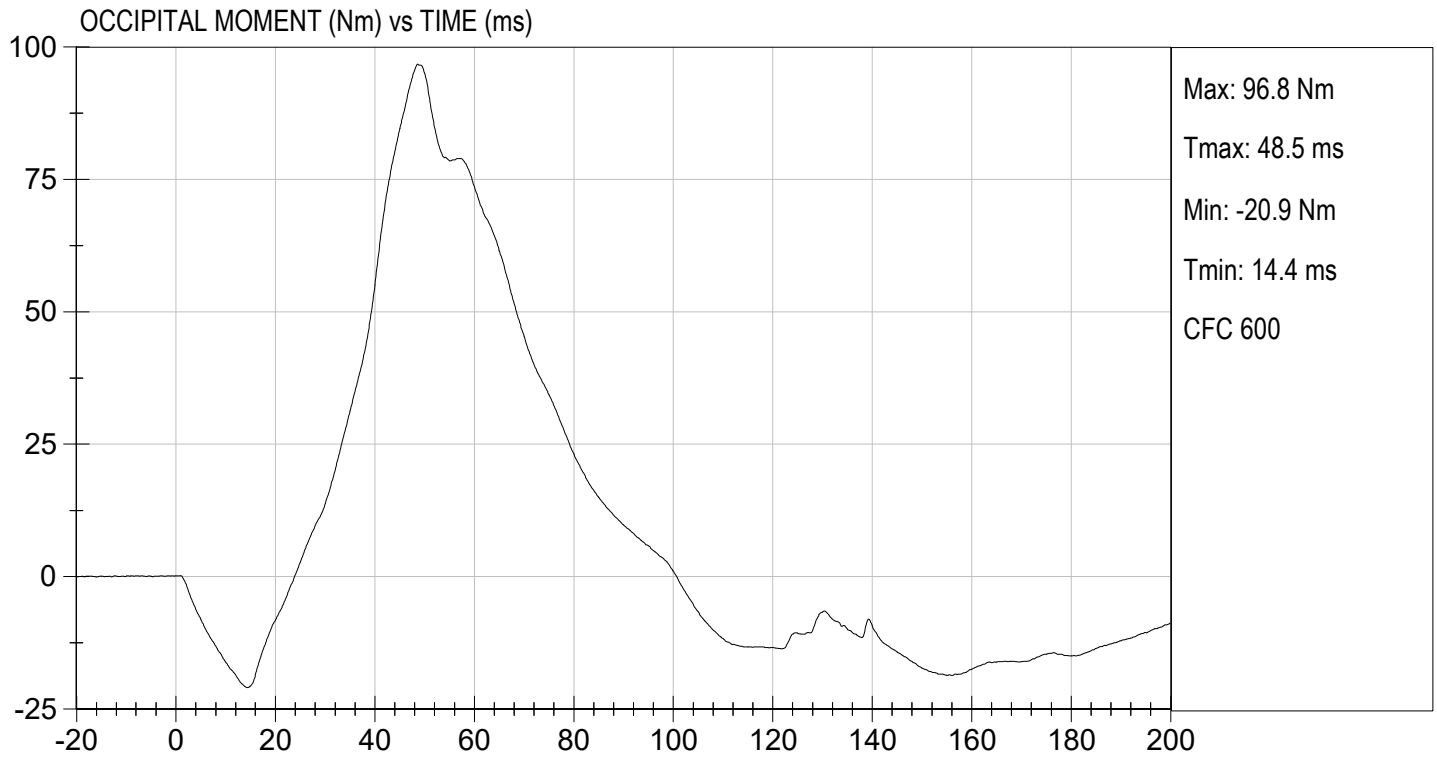
TEST DATE: 03/31/2023
TEST #: D230822





TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

TEST DATE: 03/31/2023
TEST #: D230822

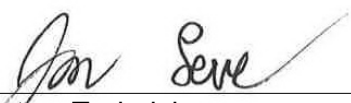


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

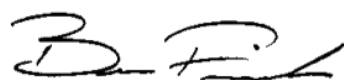
Test I.D: D230823

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	45	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	19.21	Pass
	20 ms	G's	14.00 to 19.00	15.37	Pass
	30 ms	G's	11.00 to 16.00	12.26	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	13.1	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	41.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	97.7	Pass
	Time	ms	72.0 to 82.0	78.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	161.5	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-62.5	Pass
	Time	ms	65.0 to 79.0	71.1	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	143.2	Pass
Overall Test Results					Pass


 Laboratory Technician

03/31/2023

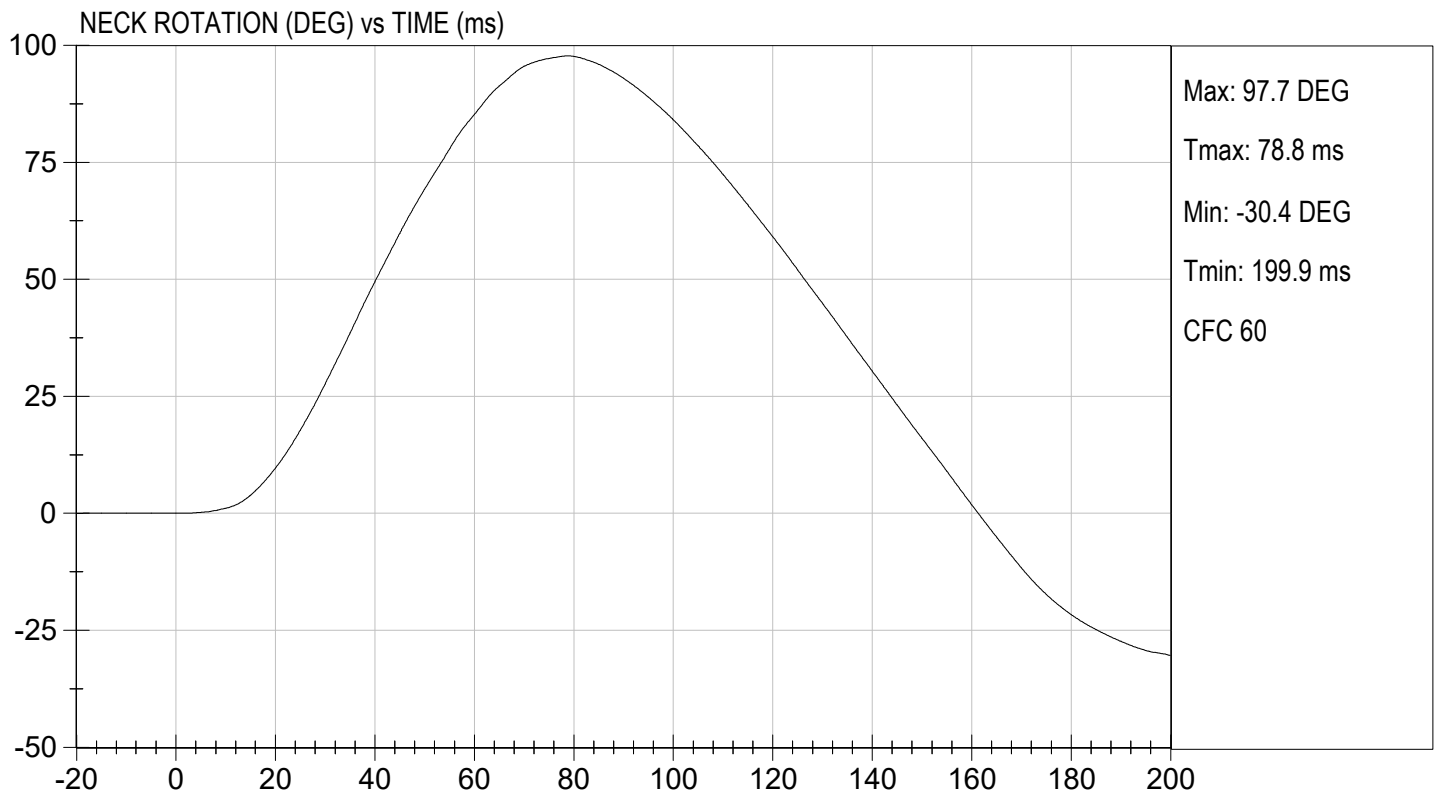
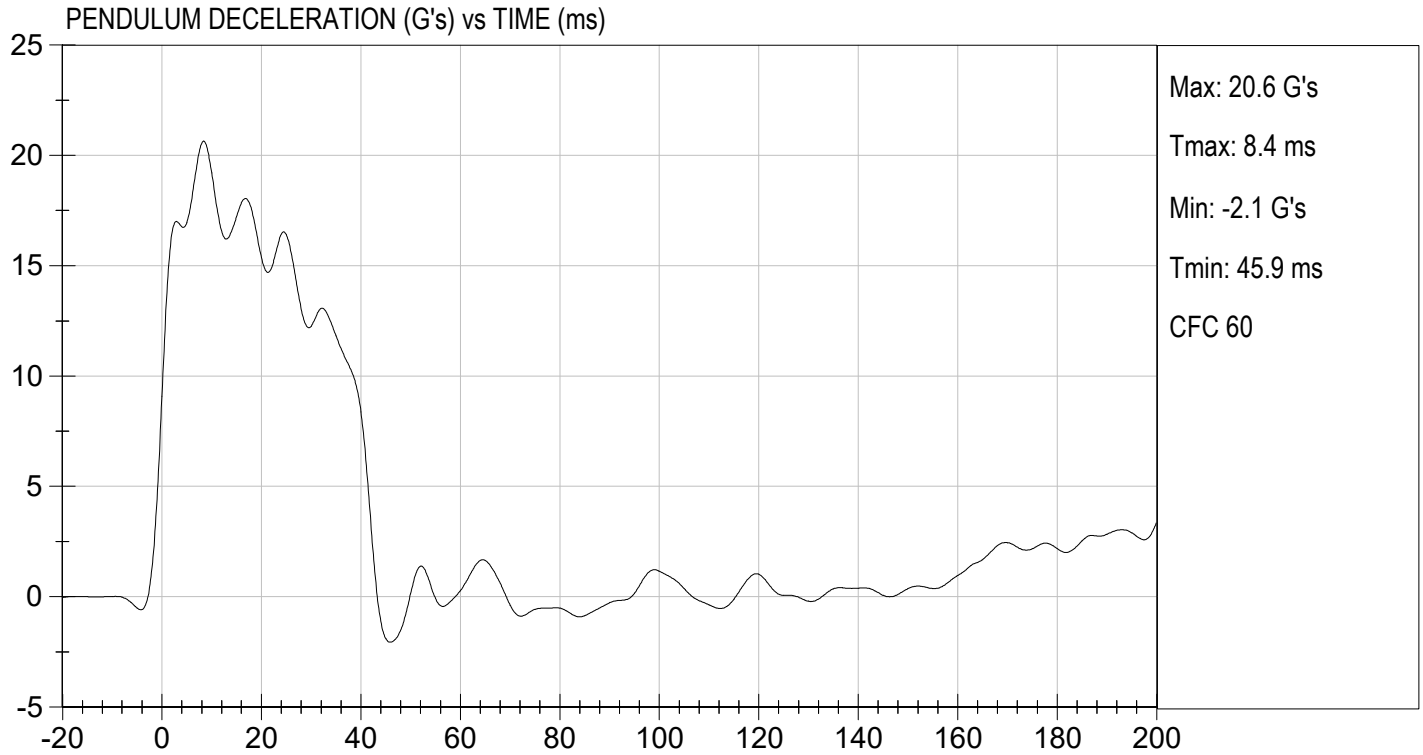
Test Date


 Approved By



TEST DESC: NECK EXTENSION
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 03/31/2023
TEST #: D230823





TEST DESC: NECK EXTENSION
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 03/31/2023
TEST #: D230823



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

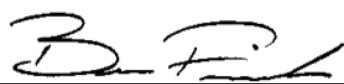
ATD Serial No: 351

Test I.D: D230824

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,758	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.65	Pass
Internal Hysteresis	%	69 to 85	72	Pass
Overall Test Results			Pass	


Laboratory Technician

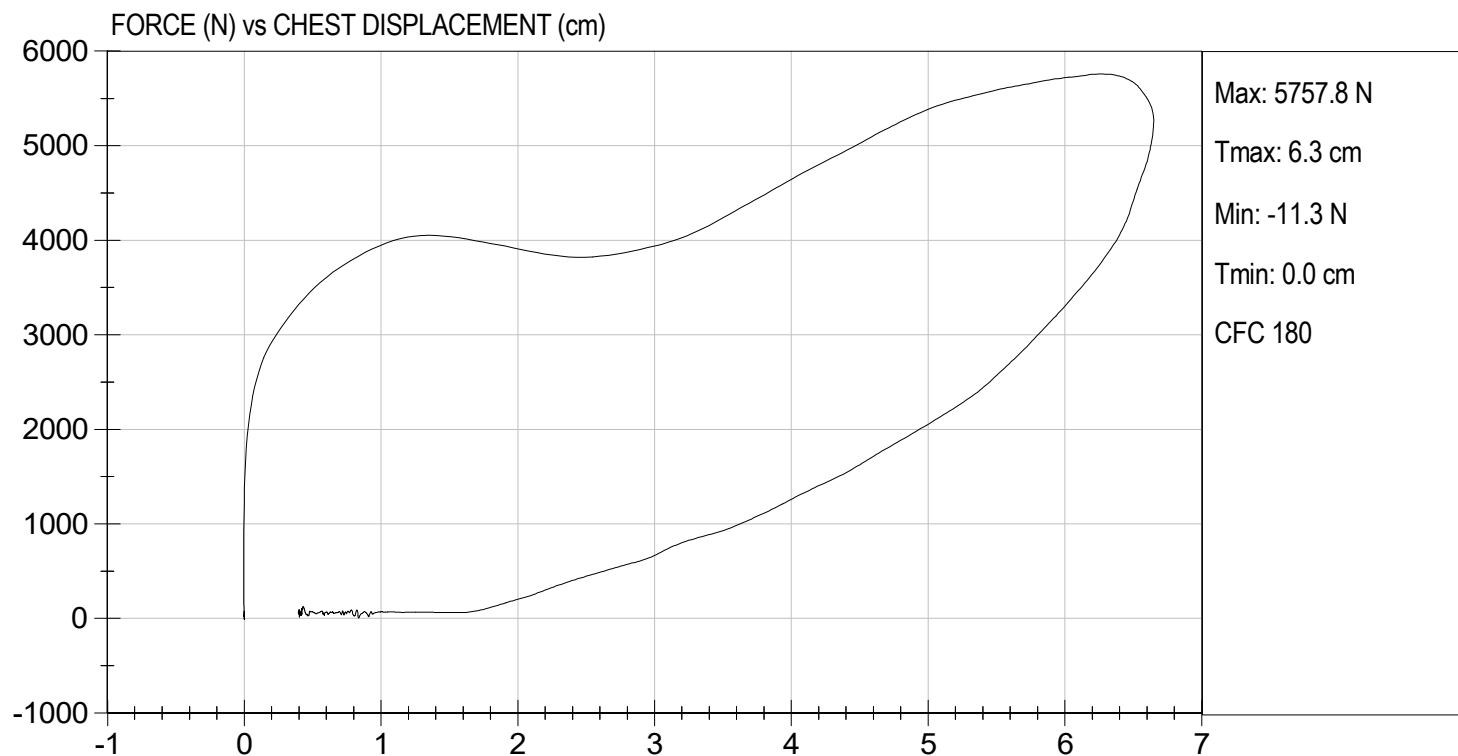
04/03/2023
Test Date


Approved By



TEST DESC: THORAX IMPACT
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 04/03/2023
TEST #: D230824



MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

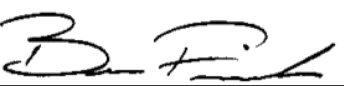
ATD Serial No: 351

Test I.D: D230825

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	34	Pass
Probe Velocity	m/s	2.07 to 2.13	2.13	Pass
Peak Probe Force	N	4715 to 5782	5,279	Pass
Overall Test Results				Pass


Laboratory Technician

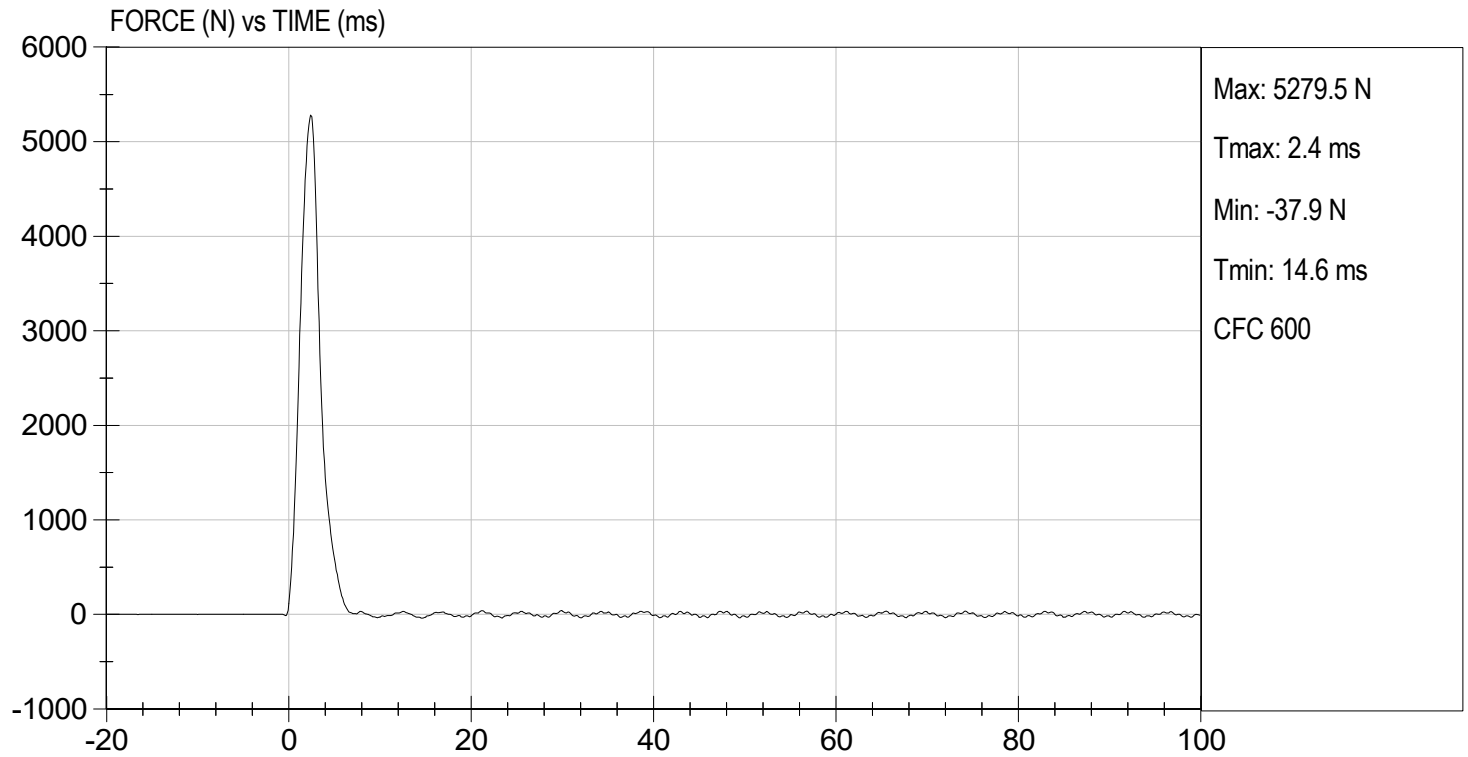
03/31/2023
Test Date


Approved By



TEST DESC: RIGHT KNEE
VELOCITY: 7.00 ft/s, 2.13 m/s

TEST DATE: 03/31/2023
TEST #: D230825



MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

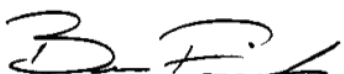
ATD Serial No: 351

Test I.D: D230826

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	34	Pass
Probe Velocity	m/s	2.07 to 2.13	2.13	Pass
Peak Probe Force	N	4715 to 5782	5,687	Pass
Overall Test Results				Pass


Laboratory Technician

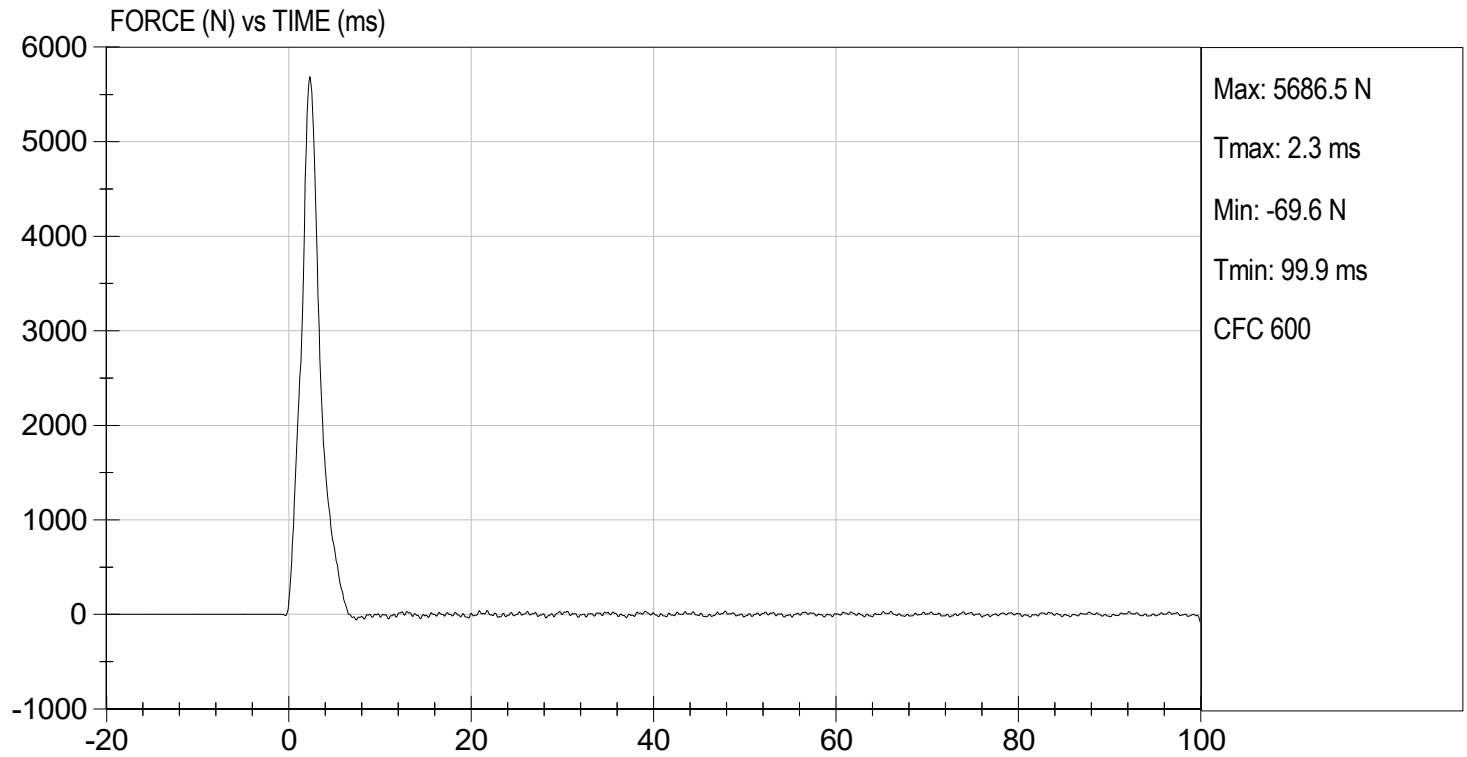
03/31/2023
Test Date


Approved By



TEST DESC: LEFT KNEE
VELOCITY: 7.00 ft/s, 2.13 m/s

TEST DATE: 03/31/2023
TEST #: D230826



MGA RESEARCH CORPORATION
HIP-FEMUR FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

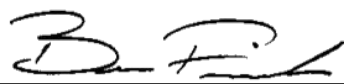
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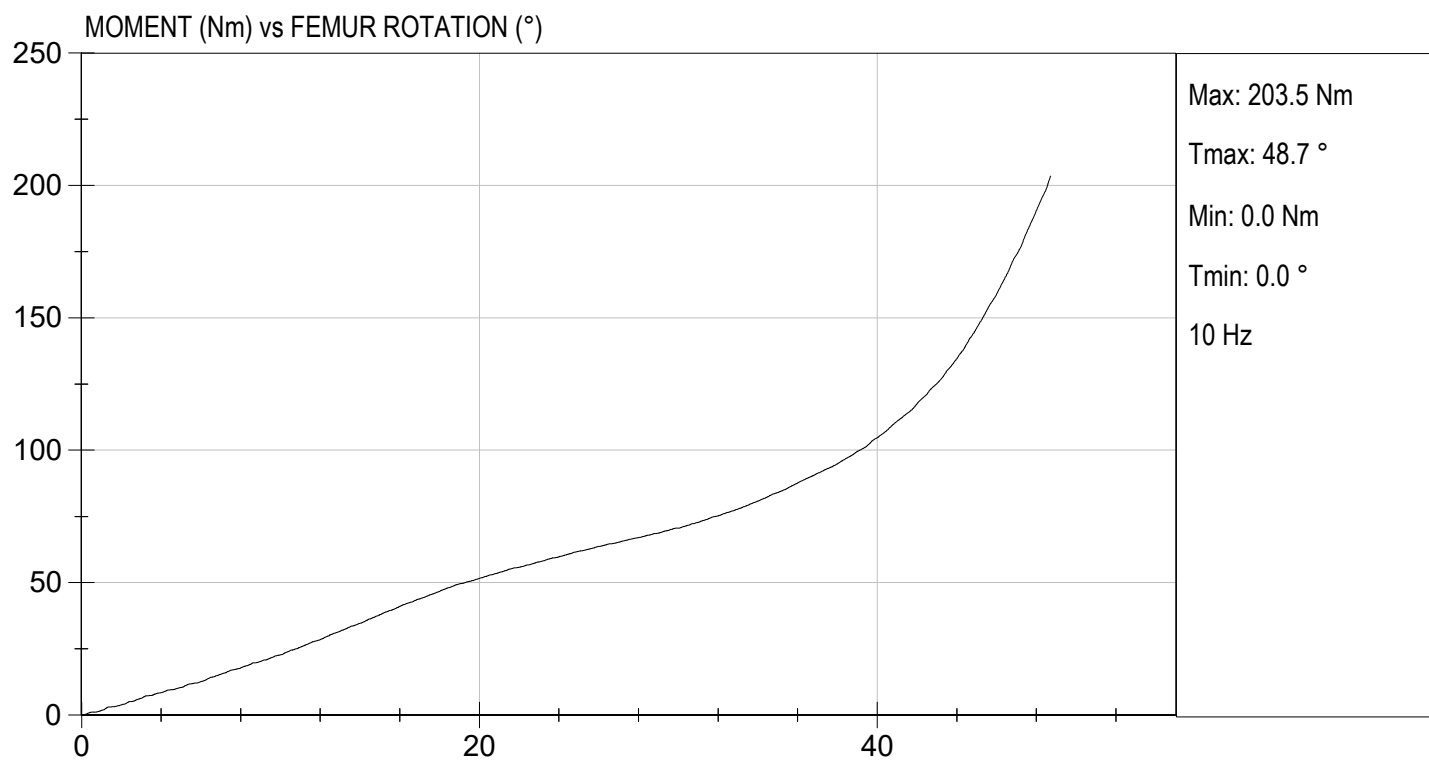
Test I.D: D230820

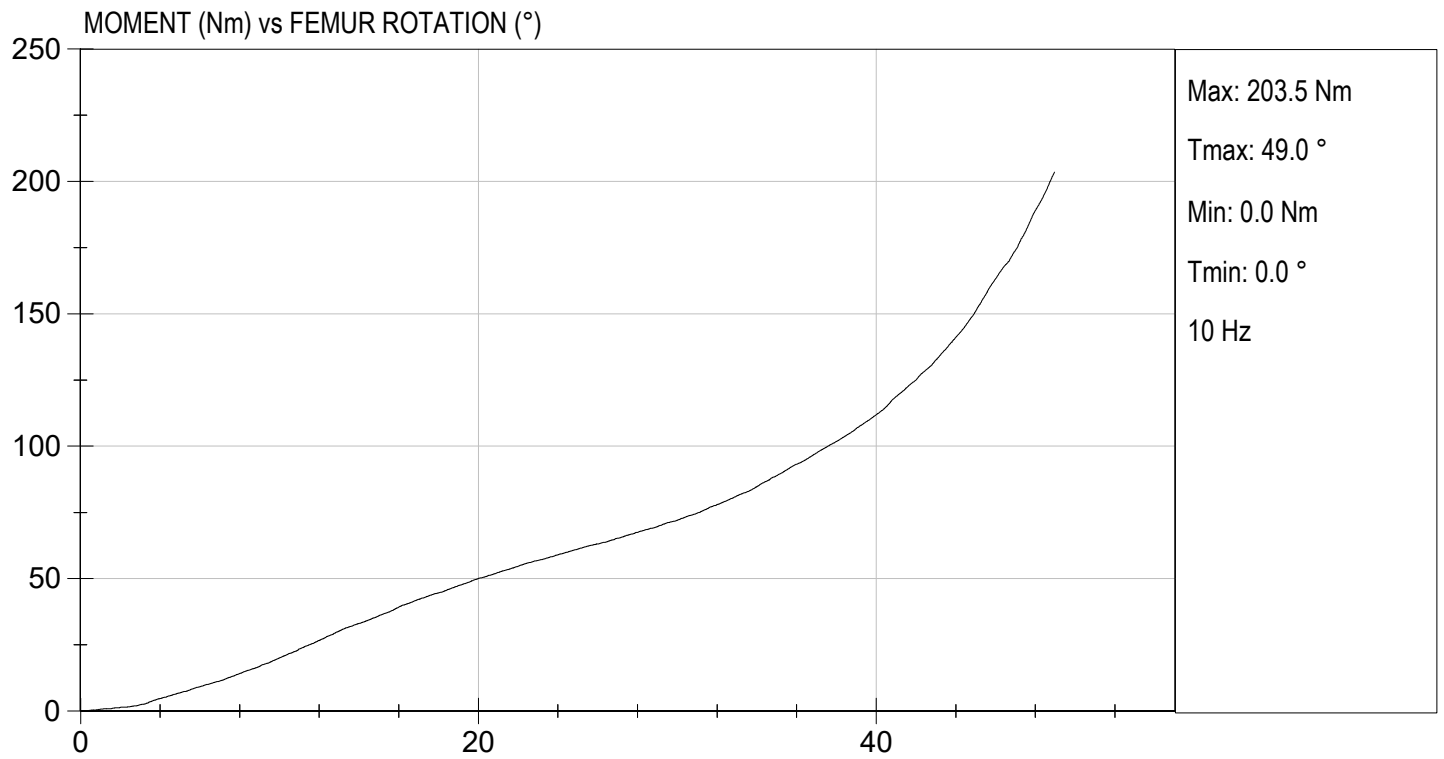
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.8	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	37	37	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.5	6.5	Pass
30 Degrees	Nm	94.9 Nm Max	70.6	72.0	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	48.7	49.0	Pass
Overall Test Results					Pass


 Laboratory Technician

03/31/2023
 Test Date


 Approved By





QUALIFICATION TEST RESULTS

PRE-TEST

HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

Hybrid III, 5th External Measurements
SN: 142

HYBRID III, PART 572, SUBPART O EXTERNAL DIMENSIONS				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
A	TOTAL SITTING HEIGHT	Seat surface to highest point on top of the head.	774.7-800.1	775.0
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	431.8-457.2	438.2
C	H-POINT HEIGHT	Reference	81.3-86.3	81.8
D	H-POINT LOCATION FROM BACKLINE	Reference	144.8-149.8	148.3
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	68.6-83.8	83.0
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	119.4-134.6	124.4
G	BACK OF ELBOW TO WRIST PIVOT	back of the elbow flesh to the wrist pivot in line with the elbow and wrist pivots	243.9-259.1	245.2
H	HEAD BACK TO BACKLINE	Back of Skull cap skin to seat rear vertical surface (Reference)	43.2-48.2	43.4
I	SHOULDER TO- ELBOW LENGTH	Measure from the highest point on top of the shoulder clevis to the lowest part of the flesh on the elbow in line with the elbow pivot bolt.	276.8-297.2	281.1
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	182.8-203.2	197.2
K	BUTTOCK TO KNEE LENGTH	The forward most part of the knee flesh to the rear vertical surface of the fixture.	520.7-546.1	537.2
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	355.6-376	358.8
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	393.7-419.1	403.1
N	BUTTOCK POPLITEAL LENGTH	The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. "K".	414-439.4	435.2

HYBRID III, SUBPART O EXTERNAL DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
O	CHEST DEPTH WITHOUT JACKET	Measured 304.8 ± 5.1 mm above seat surface	175.3-190.5	181.2
P	FOOT LENGTH	Tip of toe to rear of heal	218.5-233.7	227.3
Q	STANDING HEIGHT	(THEORETICAL)	1501.1	N/A
R	BUTTOCK TO KNEE PIVOT LENGTH	The rear surface of the buttocks to the knee pivot bolt	457.2-482.6	475.0
S	HEAD BREADTH	The widest part of the head	137.1-147.3	138.6
T	HEAD DEPTH	Back of the head to the forehead	177.8-188	181.0
U	HIP BREADTH	The widest part of the hip	299.7-314.9	308.4
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	350.5-365.7	362.1
W	FOOT BREADTH	The widest part of the foot	78.8-94	82.8
X	HEAD CIRCUMFERENCE	Measured at the point as in dim. "T"	528.3-548.7	545.2
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 345.4 ± 12.7 mm above seat surface	850.9-881.3	870.7
Z	WAIST CIRCUMFERENCE	Measured 165.1 ± 5.1 mm above seat surface	759.5-789.9	779.9
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	332.7-358.1	350.1
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	160.1-170.2	170.0

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

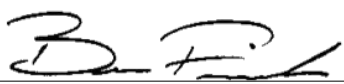
ATD Serial No: 142

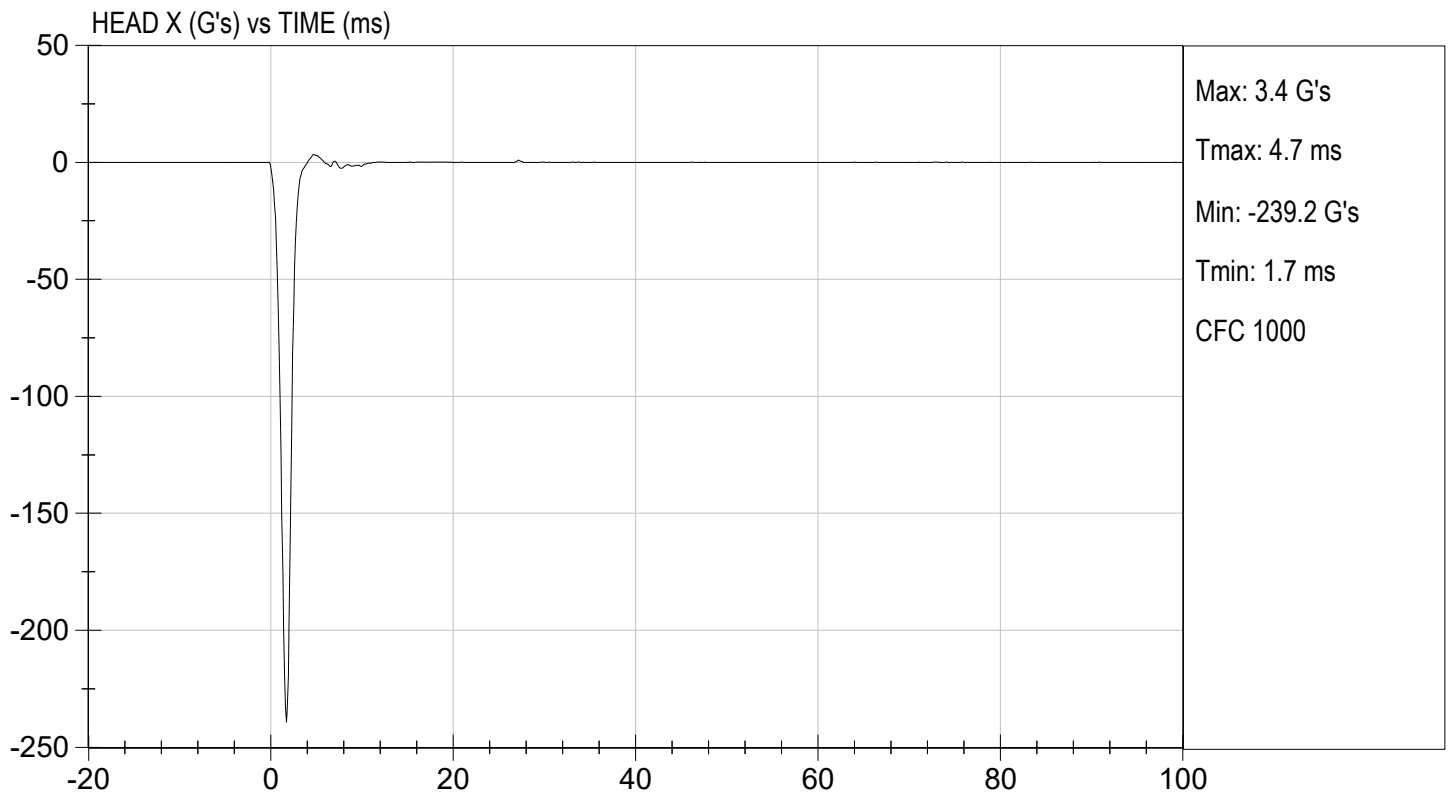
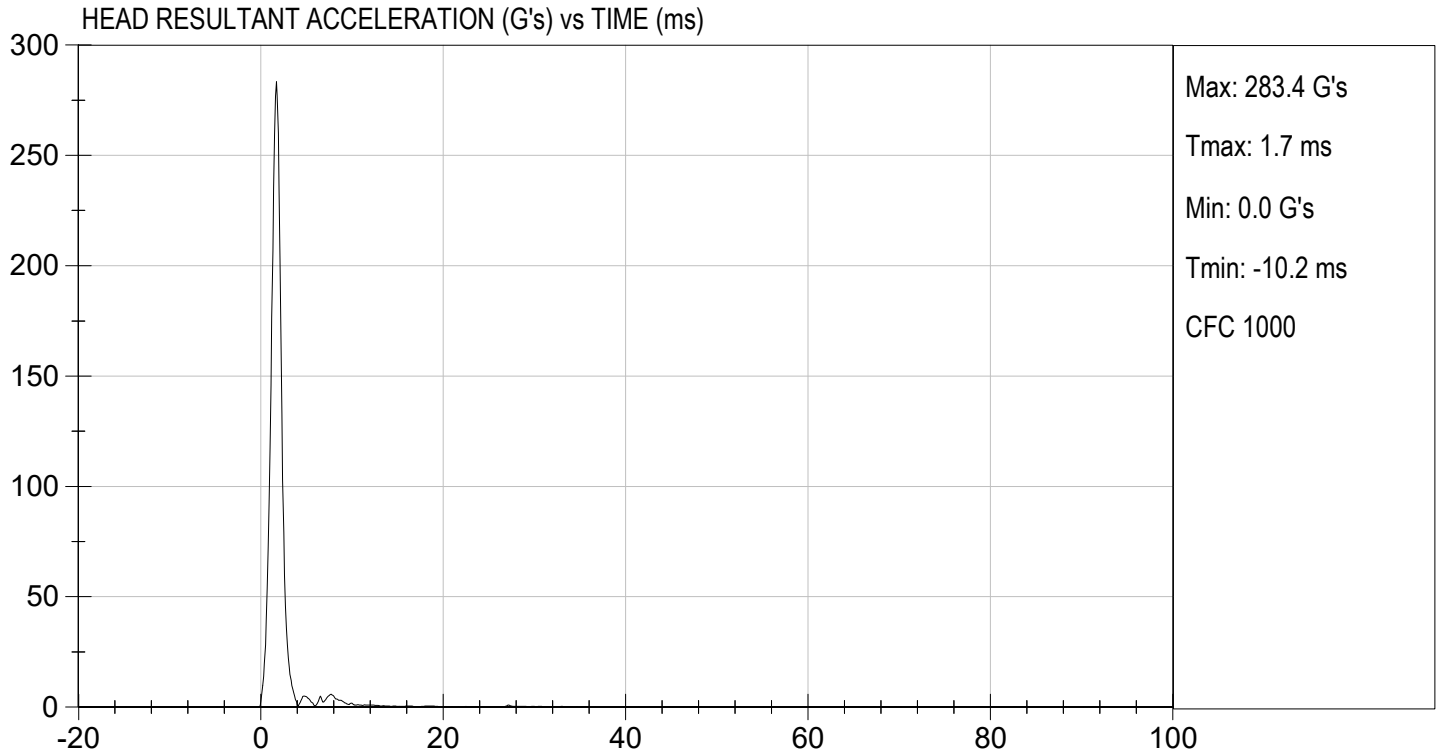
Test ID: D230611

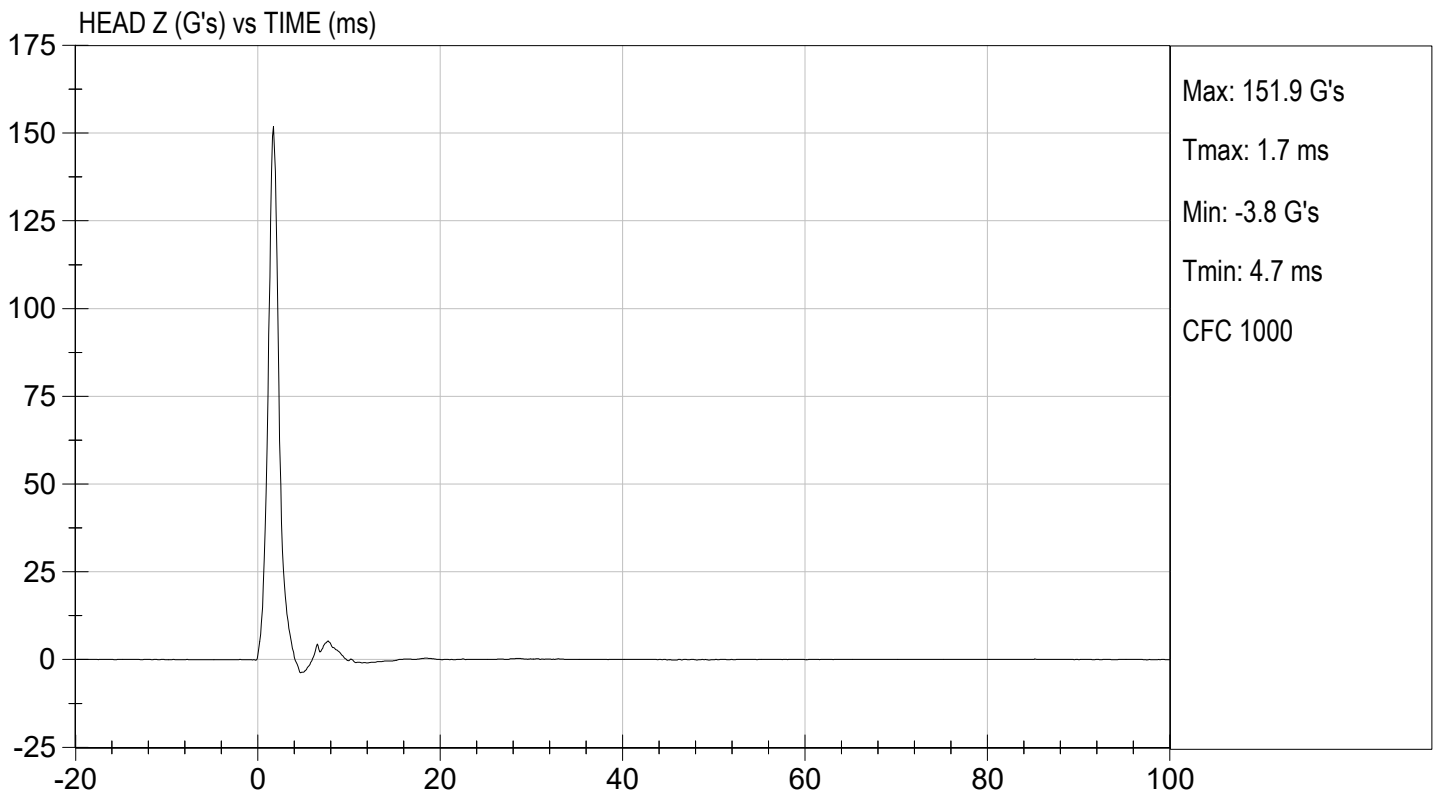
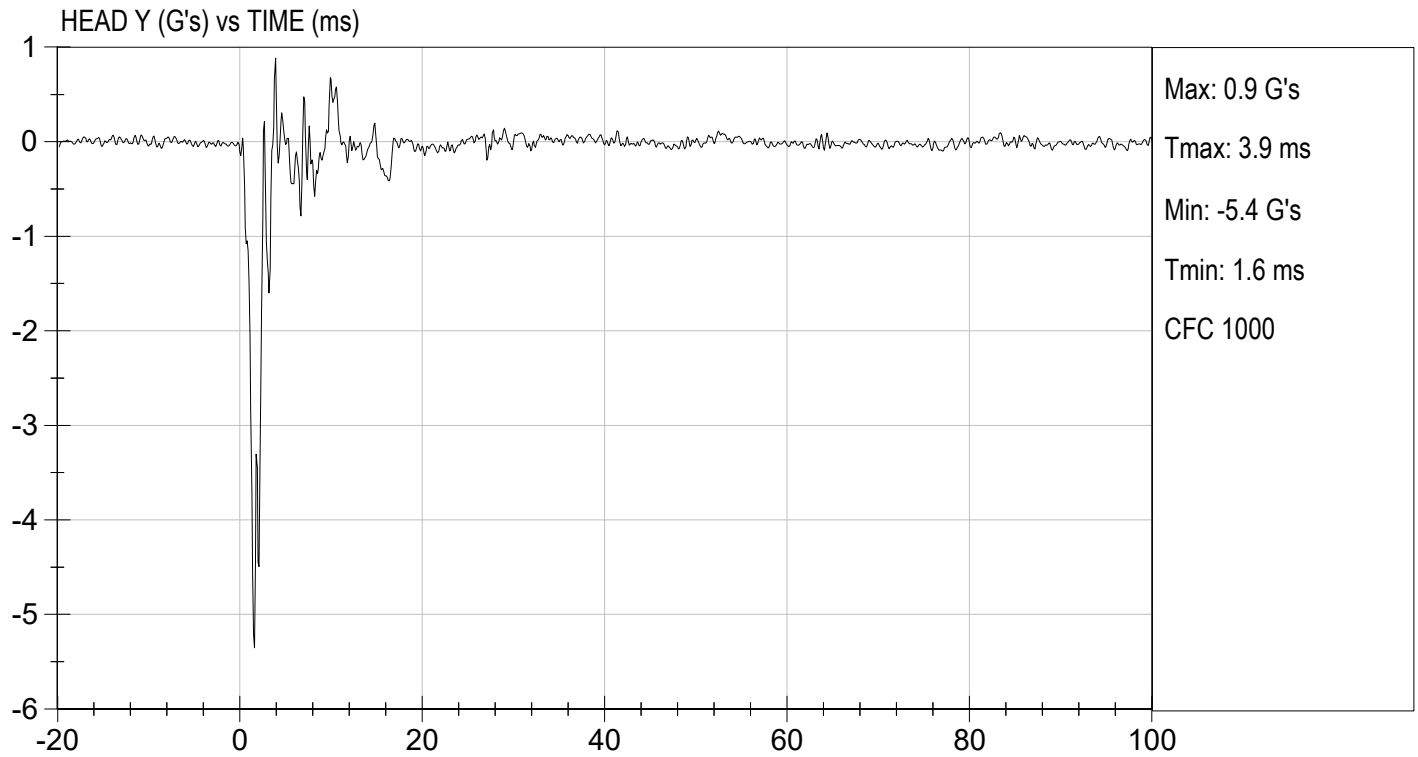
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	24	Pass
Peak Resultant Acceleration	G's	250 to 300	283	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-5.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results			Pass	


Laboratory Technician

03/13/2023
Test Date


Approved By



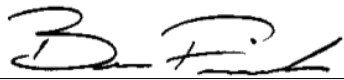


MGA RESEARCH CORPORATION**NECK FLEXION TEST****HYBRID III 5TH PERCENTILE**ATD Serial No: 142Test I.D: D23AD2

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	27	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Velocity	10 ms	m/s	2.1 to 2.5	2.3	Pass
	20 ms	m/s	4.0 to 5.0	4.5	Pass
	30 ms	m/s	5.8 to 7.0	6.6	Pass
D Plane Rotation	Max	deg	77 to 91	81	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	71	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	86	Pass
Overall Results				Pass	


Laboratory Technician

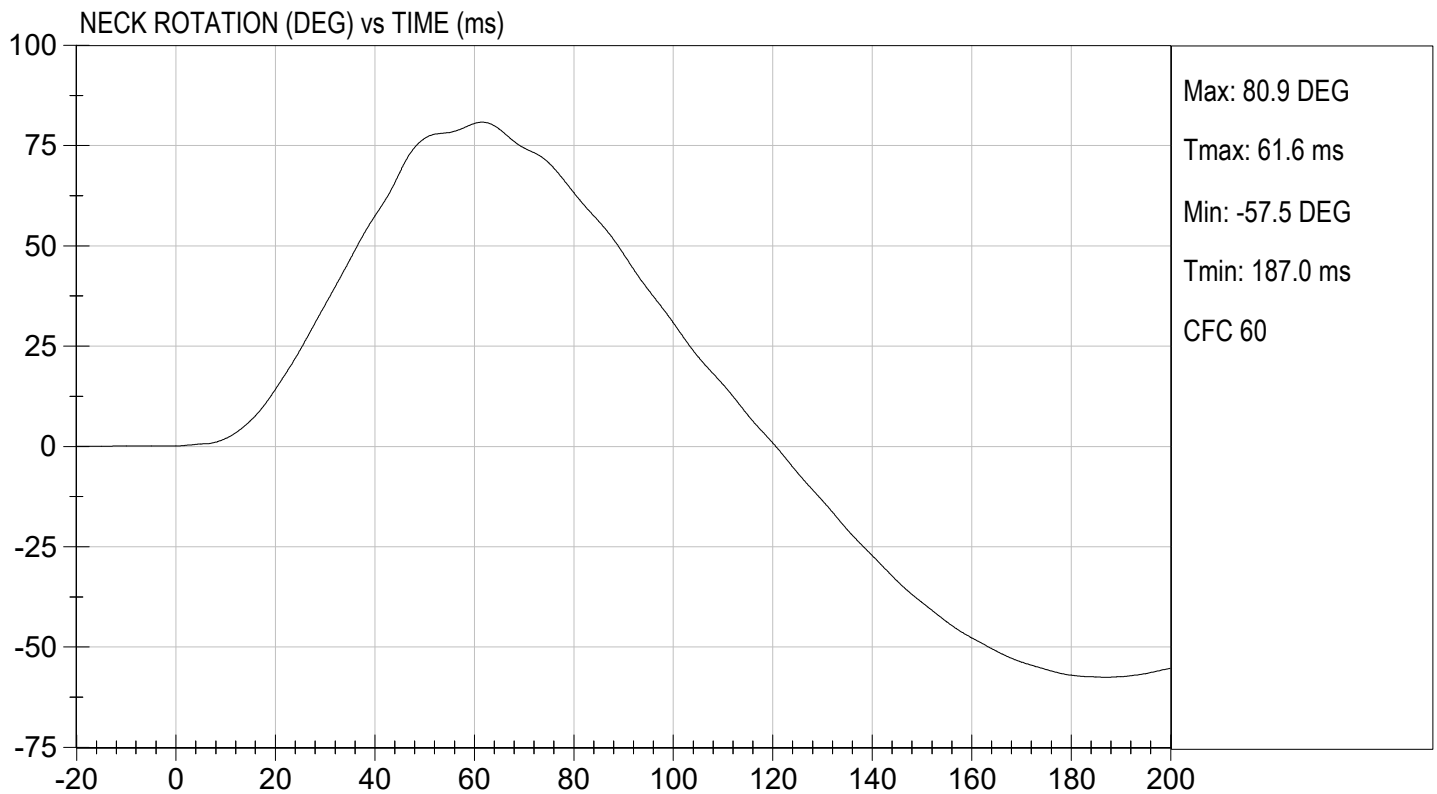
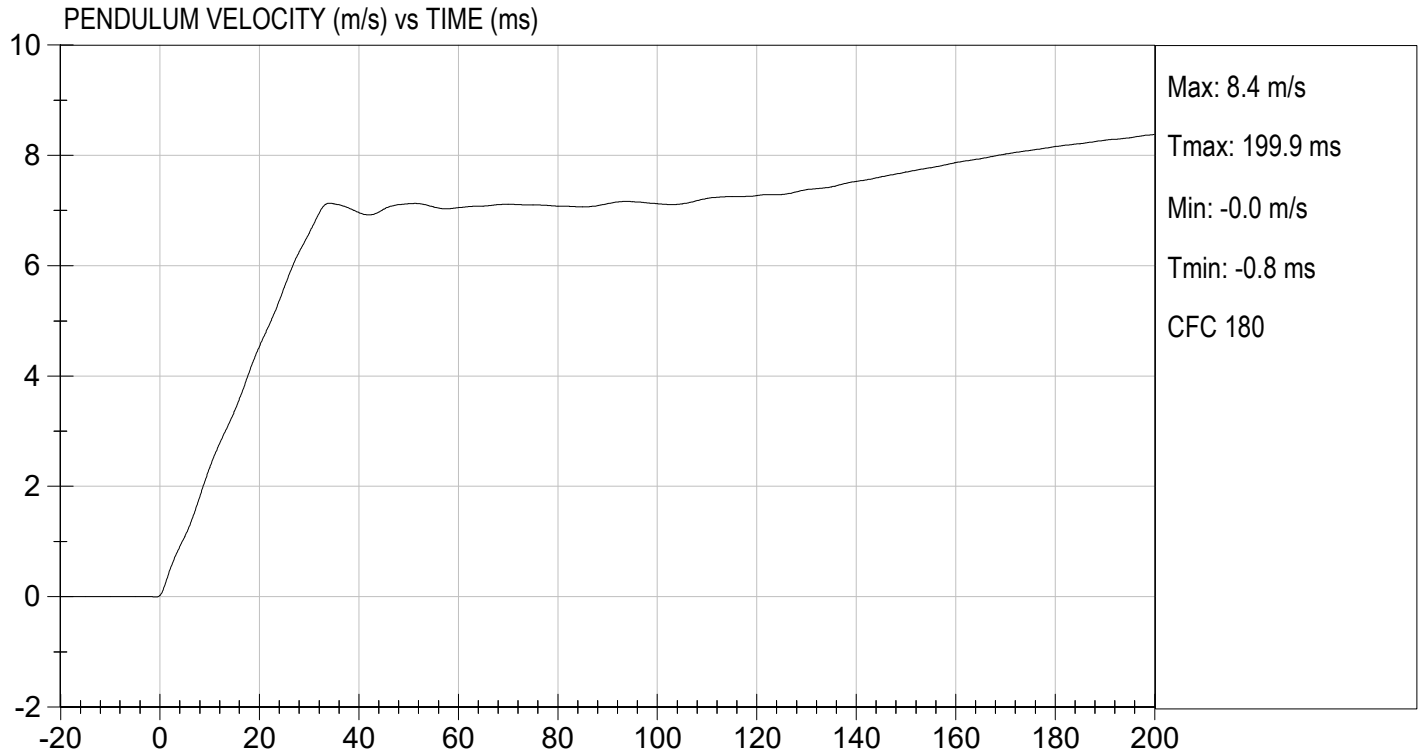
03/24/2023
Test Date


Approved By



TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

TEST DATE: 03/24/2023
TEST #: D23AD2





TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

TEST DATE: 03/24/2023
TEST #: D23AD2



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

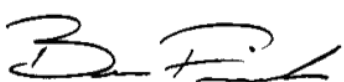
ATD Serial No: 142

Test I.D: D23AD3

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	27	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.6	Pass
	30 ms	m/s	4.6 to 5.6	5.3	Pass
D Plane Rotation	Max	deg	99 to 114	110	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-54	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	104	Pass
Overall Results					Pass


Laboratory Technician

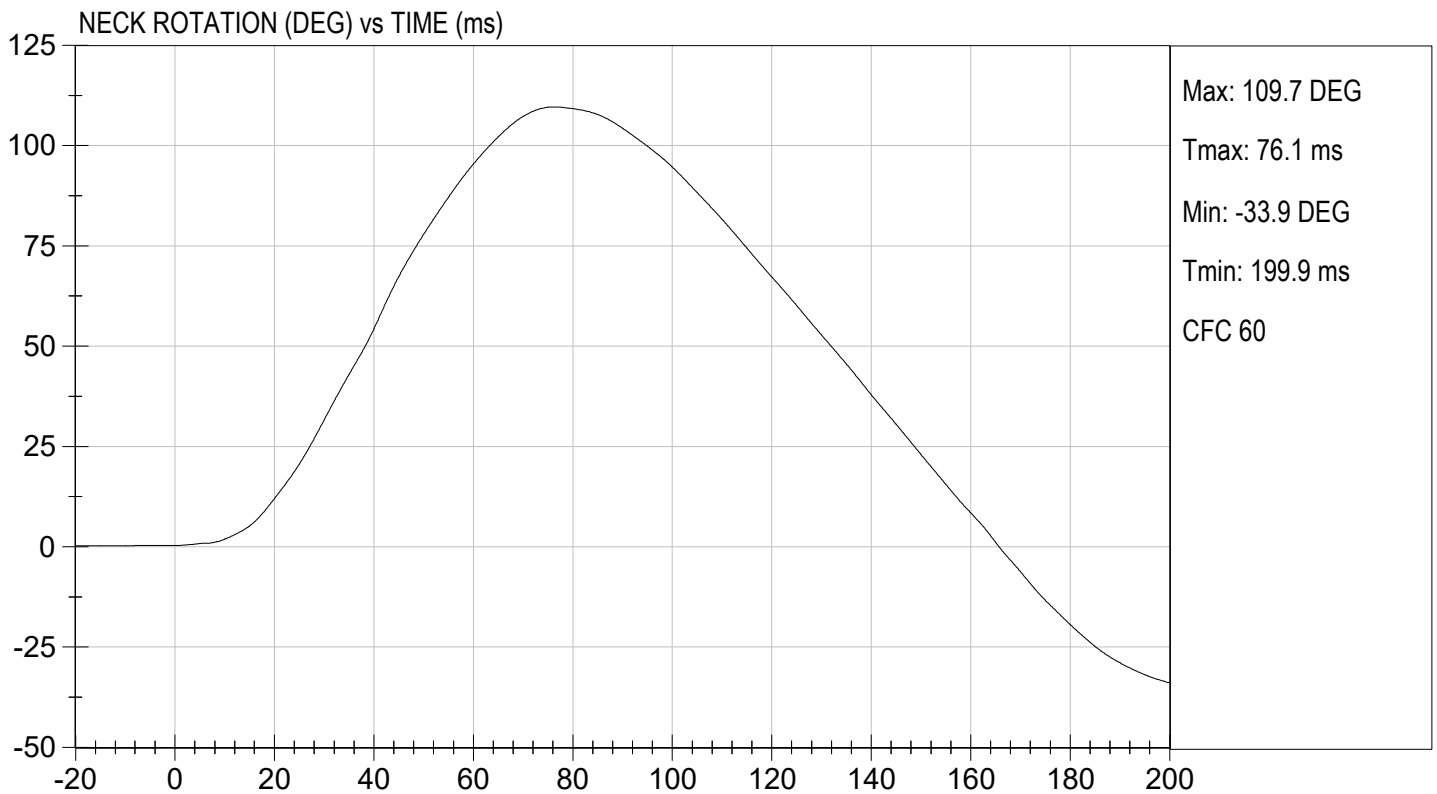
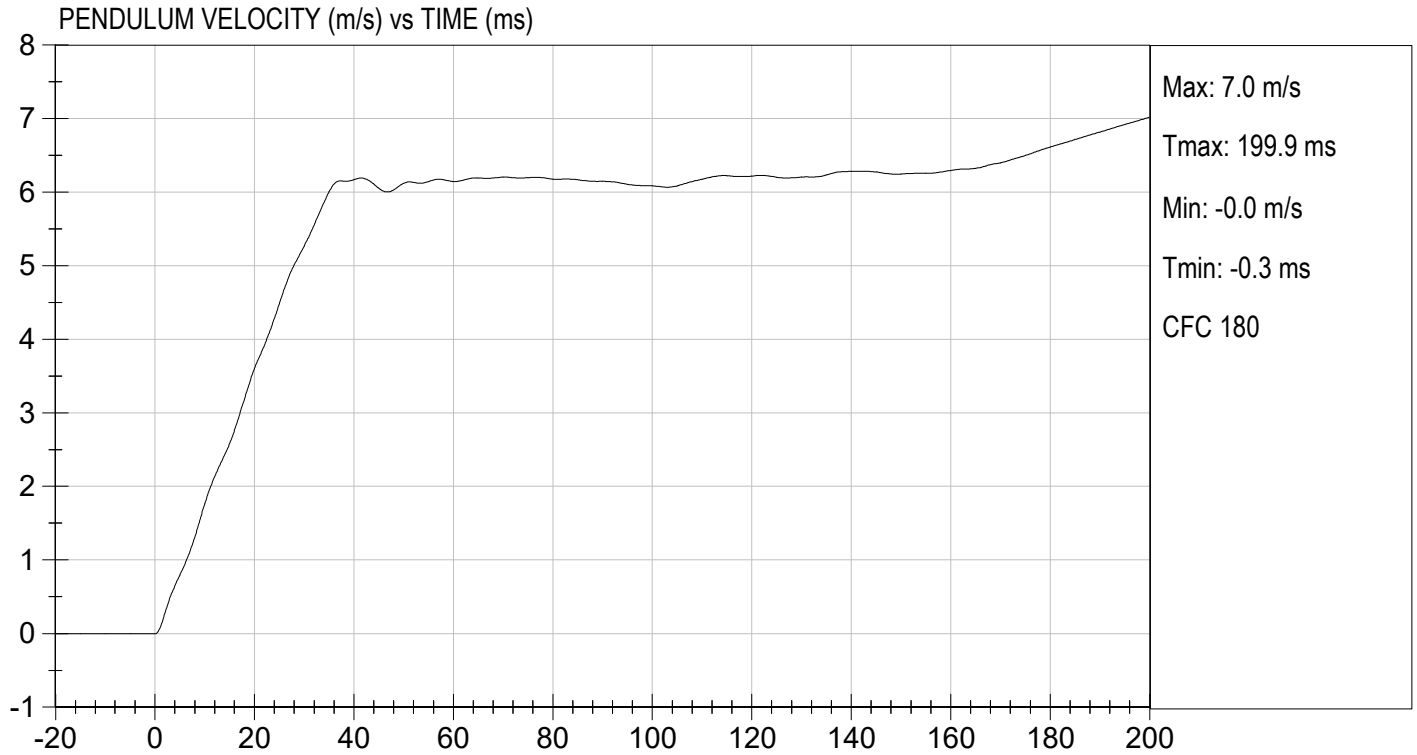
03/24/2023
Test Date


Approved By



TEST DESC: NECK EXTENSION
VELOCITY: 20.08 ft/s, 6.12 m/s

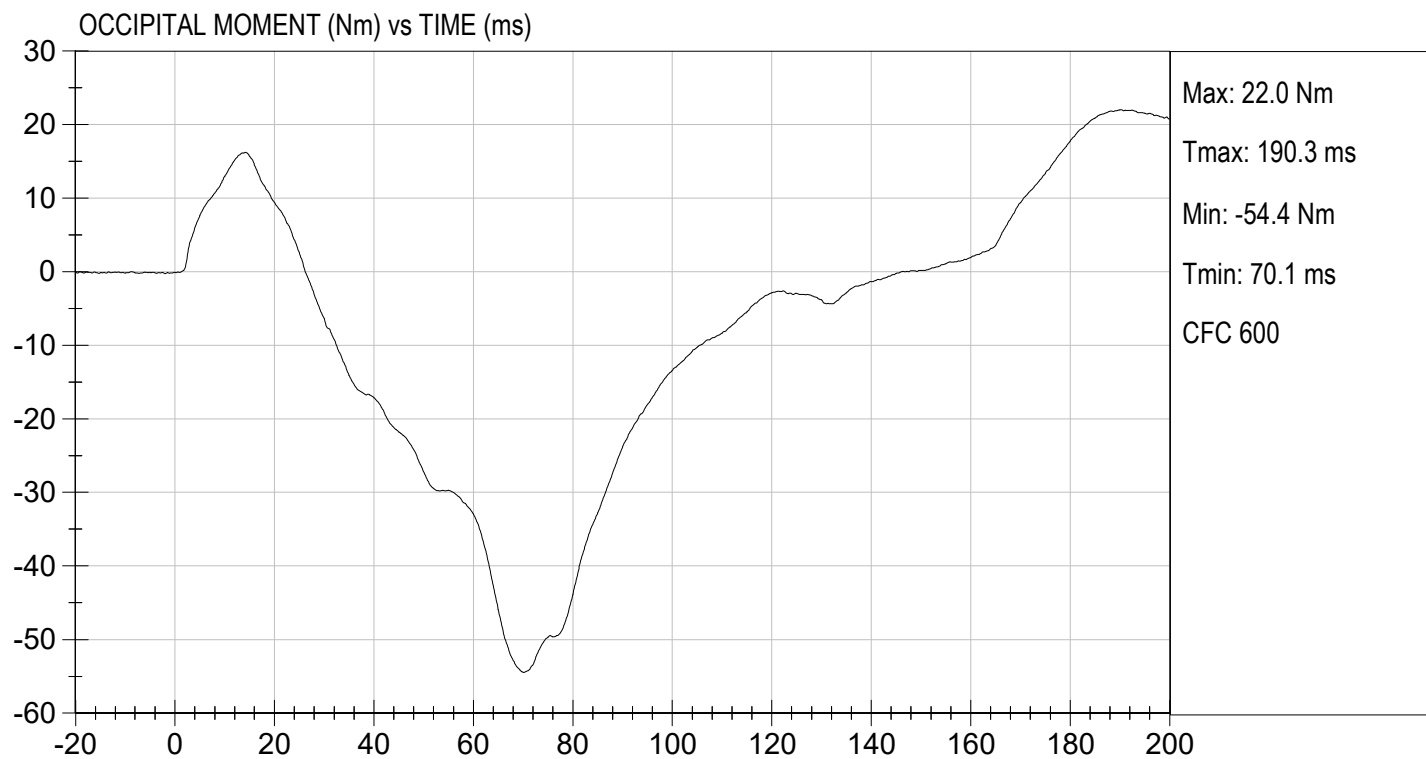
TEST DATE: 03/24/2023
TEST #: D23AD3





TEST DESC: NECK EXTENSION
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 03/24/2023
TEST #: D23AD3



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 142

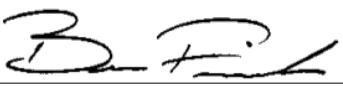
Test I.D: D230614

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Relative Humidity	%	10 to 70	25	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	51	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4238	Pass
Internal Hysteresis	%	69 to 85	76	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4351	Pass
Overall Test Results				Pass


Laboratory Technician

03/13/2023

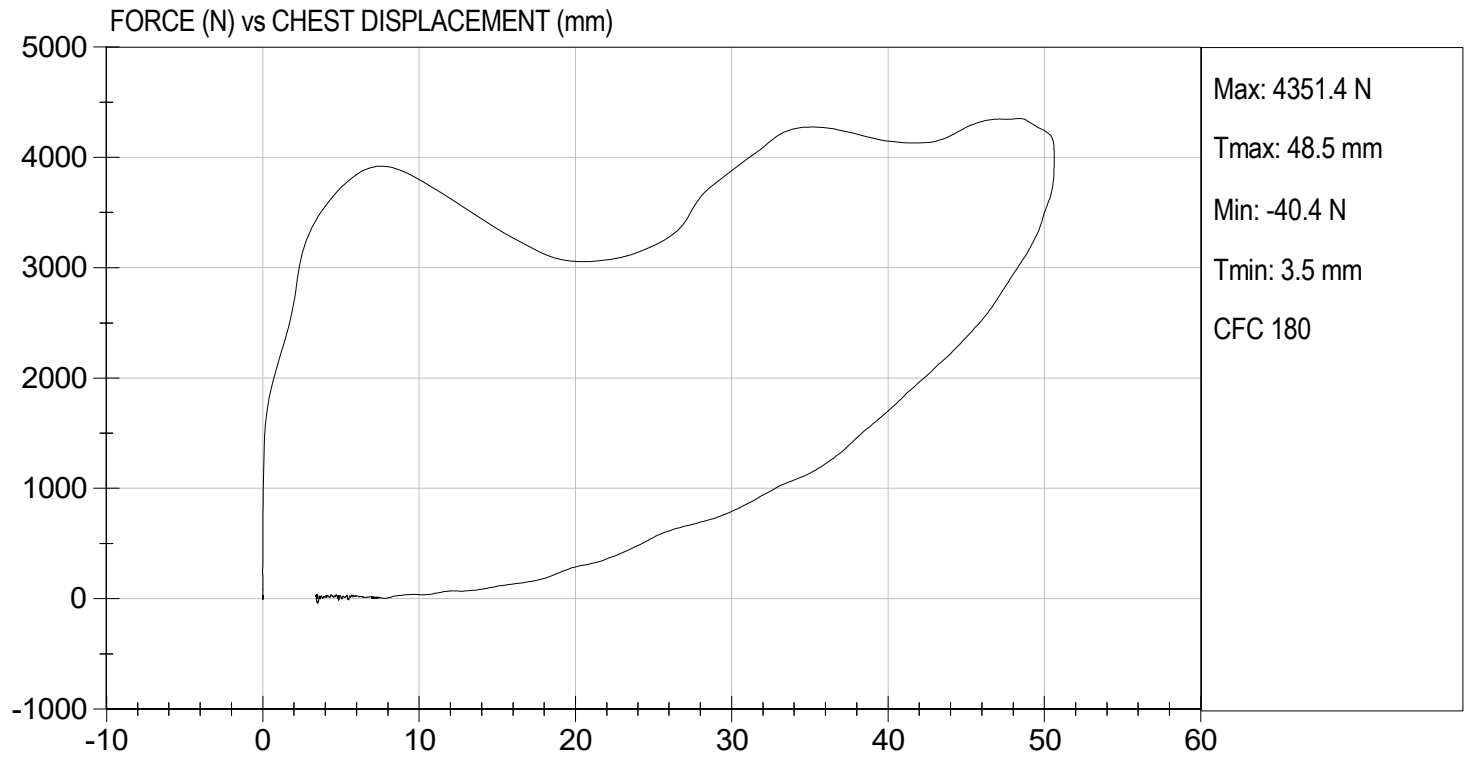
Test Date


Approved By



TEST DESC: THORAX IMPACT
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 03/13/2023
TEST #: D230614



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 142

Test I.D: D230615

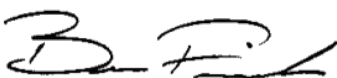
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	24	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3838	Pass
Overall Test Results				Pass



Laboratory Technician

03/13/2023

Test Date

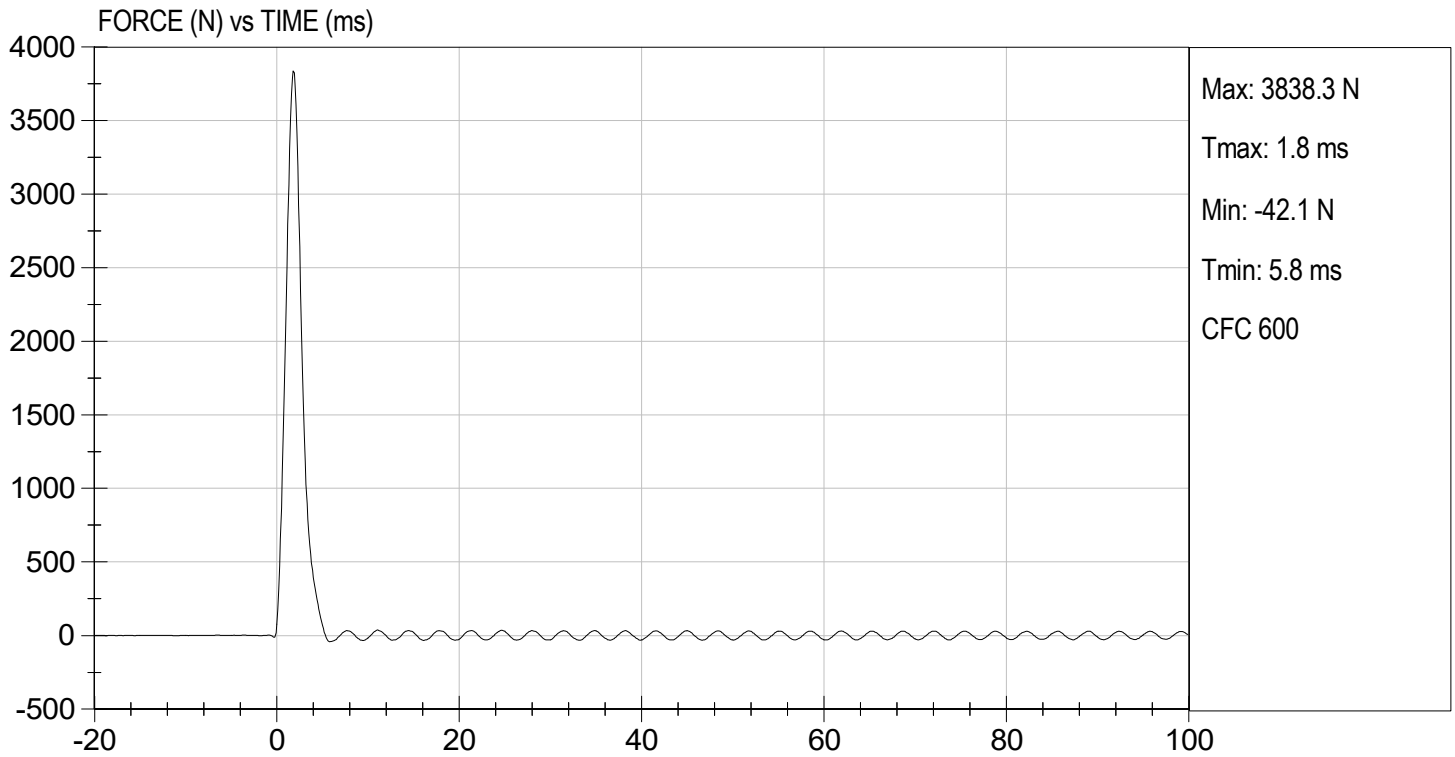


Approved By



TEST DESC: RIGHT KNEE
VELOCITY: 6.94 ft/s, 2.12 m/s

TEST DATE: 03/13/2023
TEST #: D230615



MGA RESEARCH CORPORATION

**LEFT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE**

ATD Serial No: 142

Test I.D: D230616

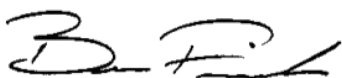
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	24	Pass
Probe Speed	m/s	2.07 to 2.13	2.10	Pass
Maximum Force	N	3450 to 4060	3652	Pass
Overall Test Results				Pass



Laboratory Technician

03/13/2023

Test Date

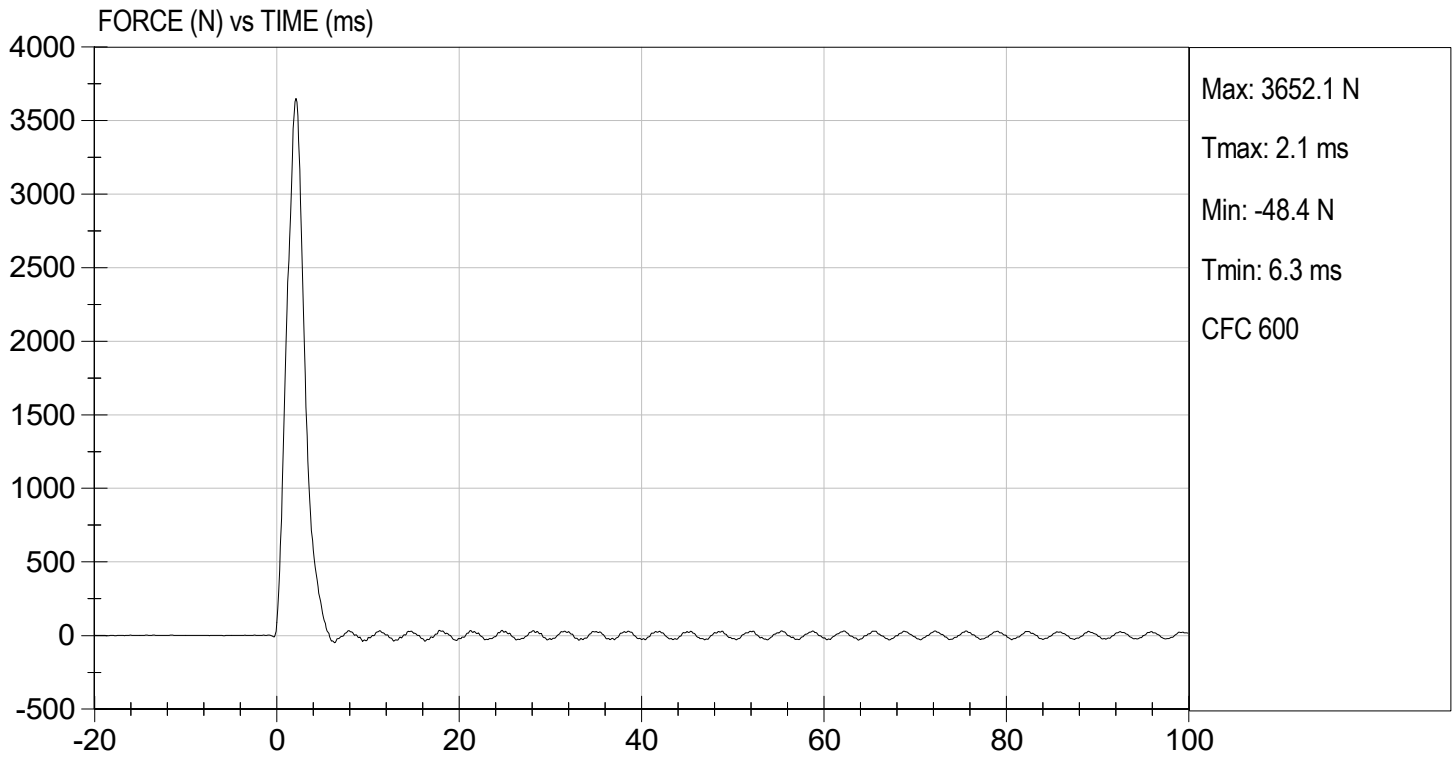


Approved By



TEST DESC: LEFT KNEE
VELOCITY: 6.89 ft/s, 2.10 m/s

TEST DATE: 03/13/2023
TEST #: D230616



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 142

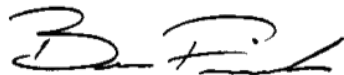
Test I.D: D230617

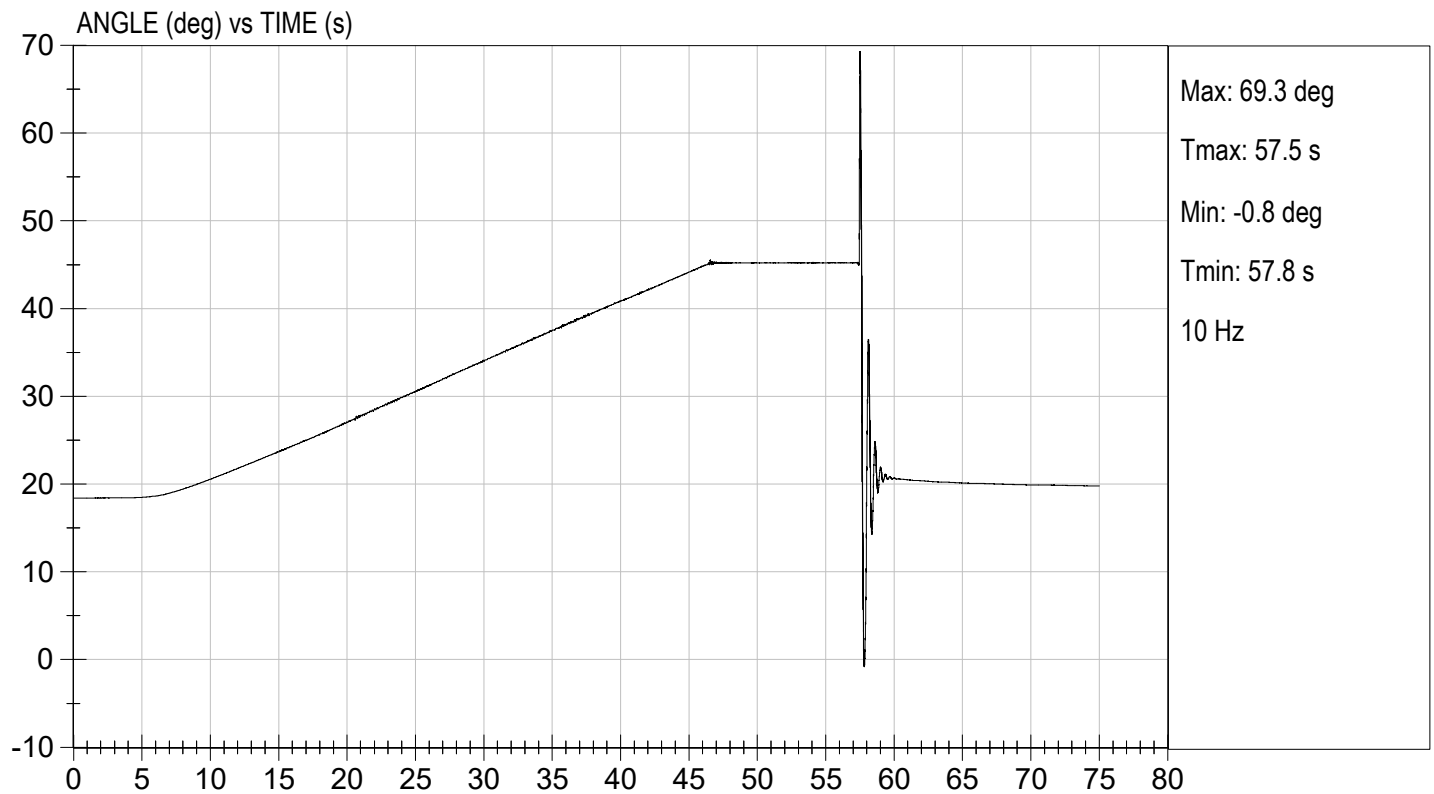
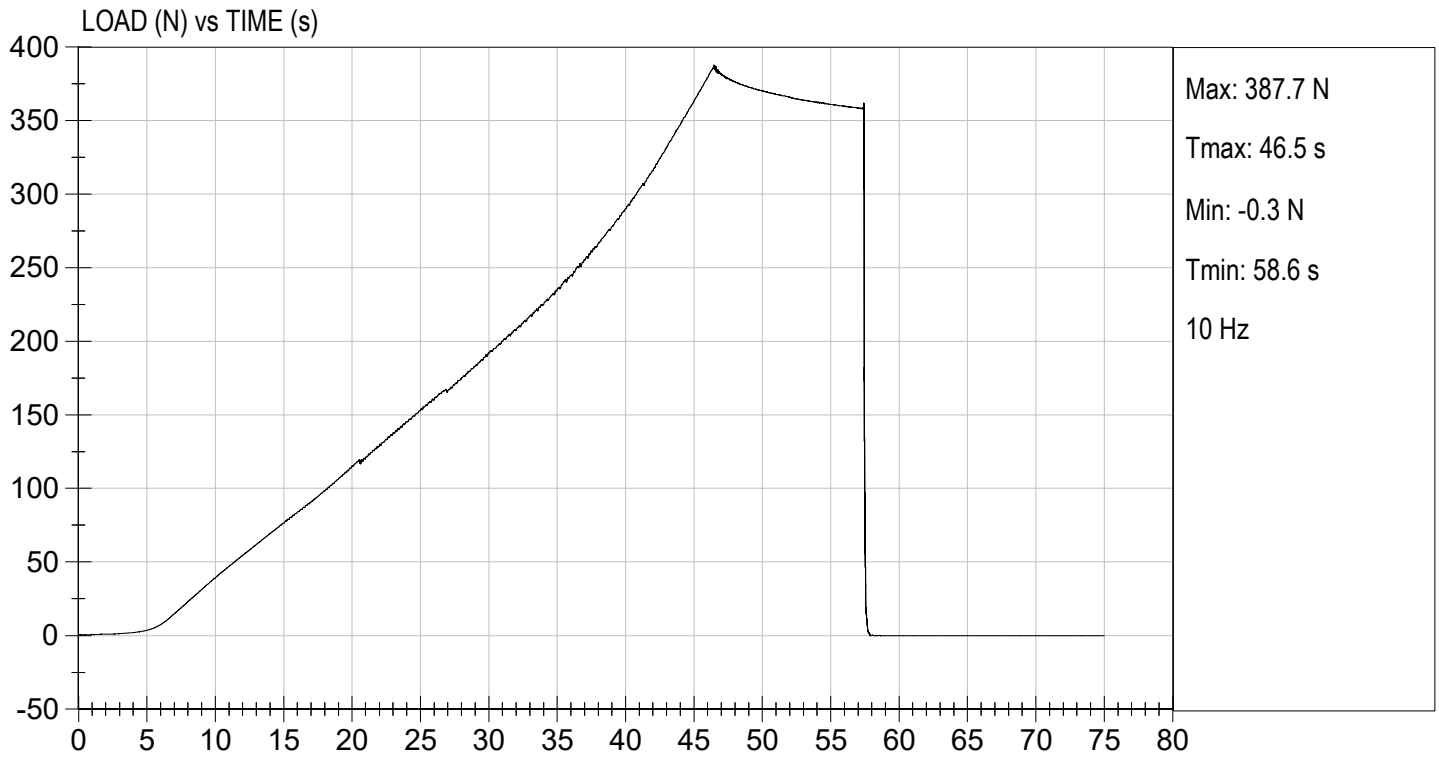
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	24	Pass
Initial Angle	deg	0 to 20	18	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	388	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.7	Pass
Overall Result			Pass	


Laboratory Technician

03/13/2023

Test Date


Approved By



QUALIFICATION TEST RESULTS

POST-TEST

HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

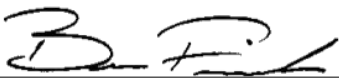
ATD Serial No: 142

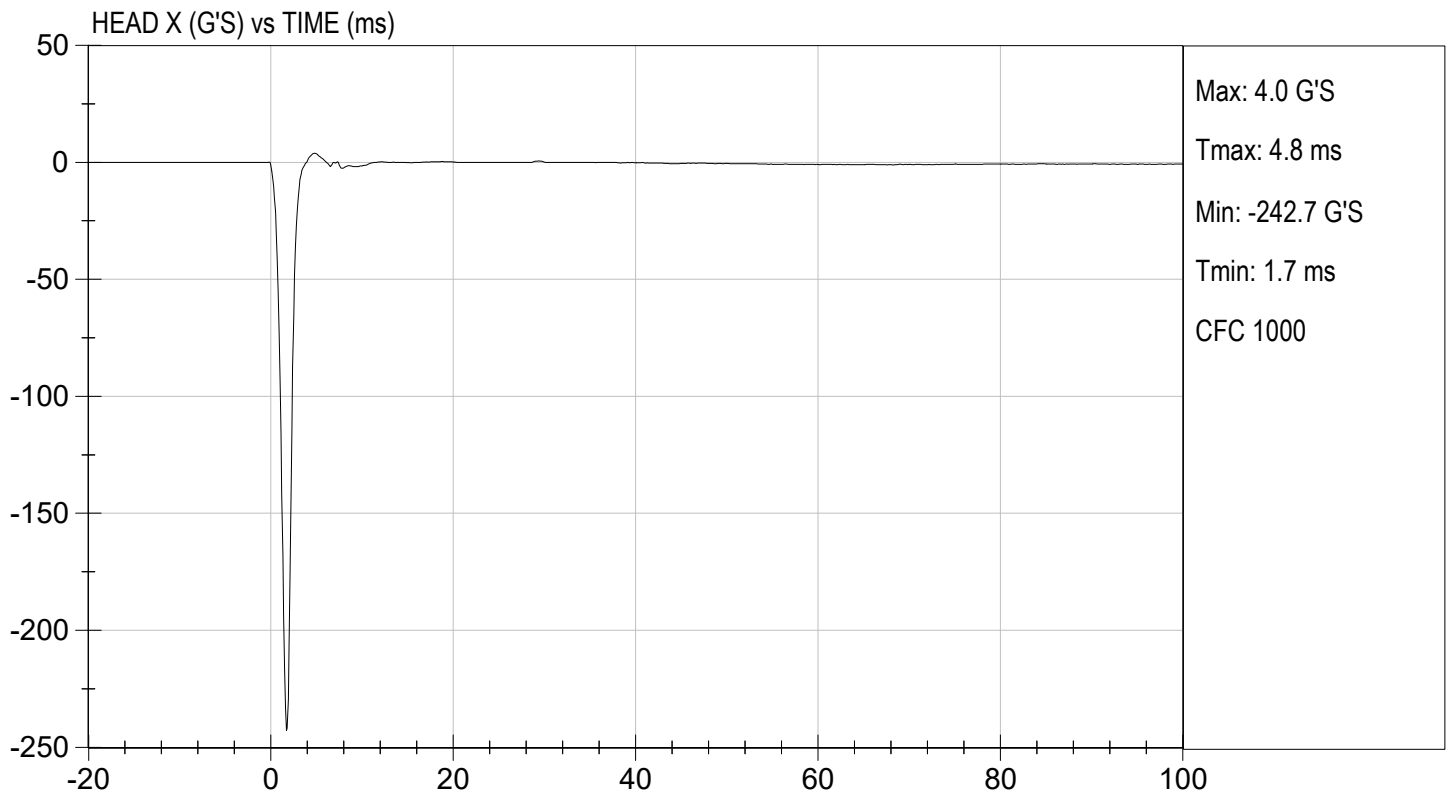
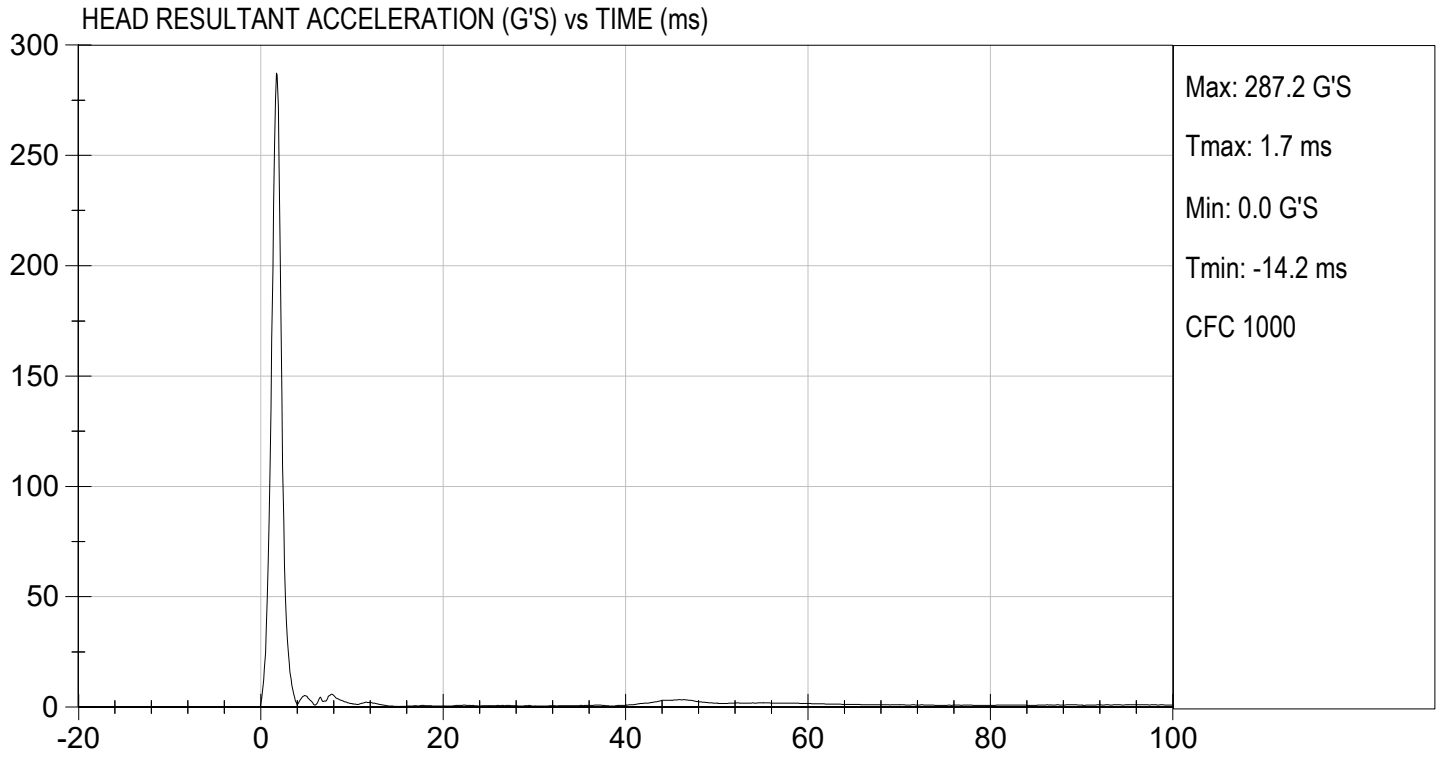
Test ID: D230811

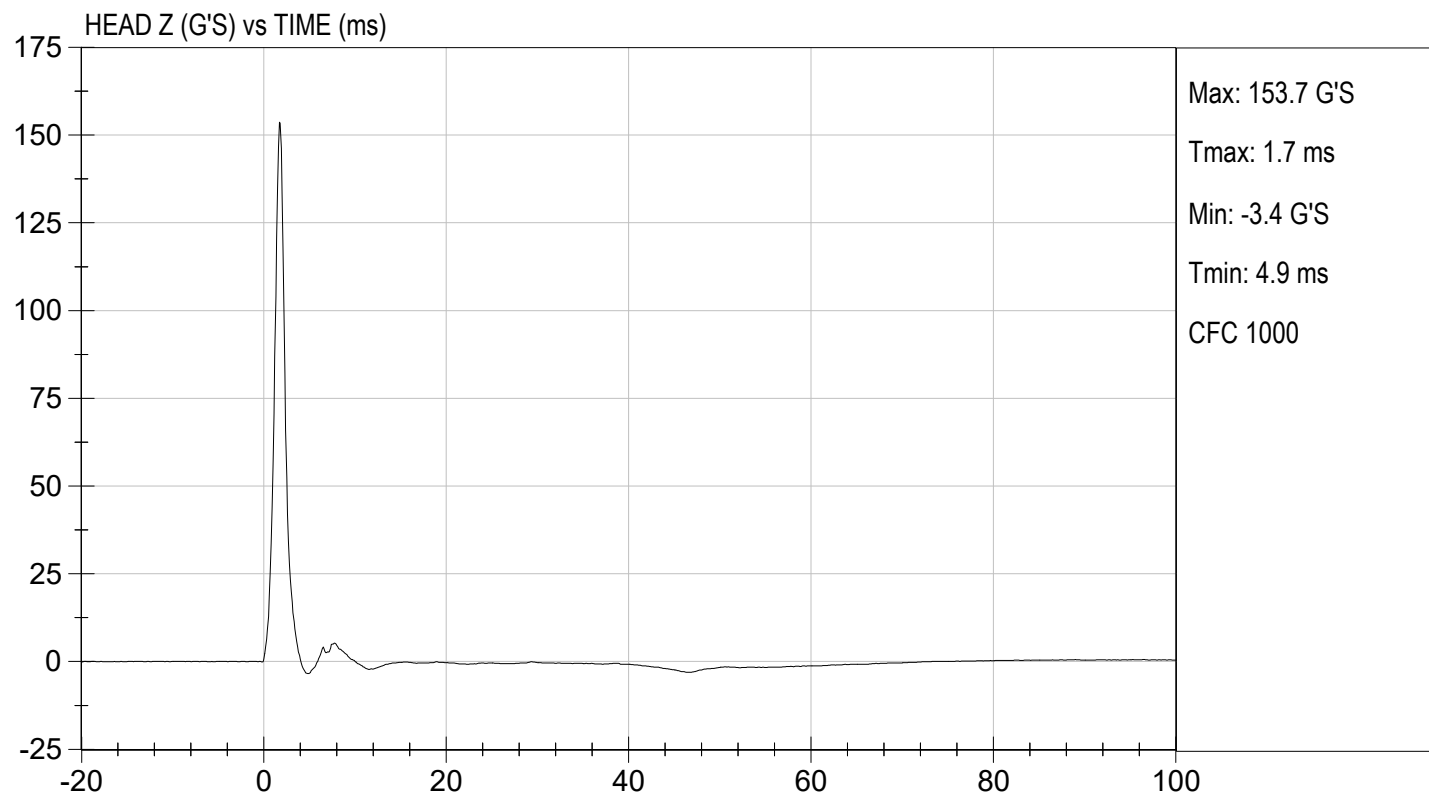
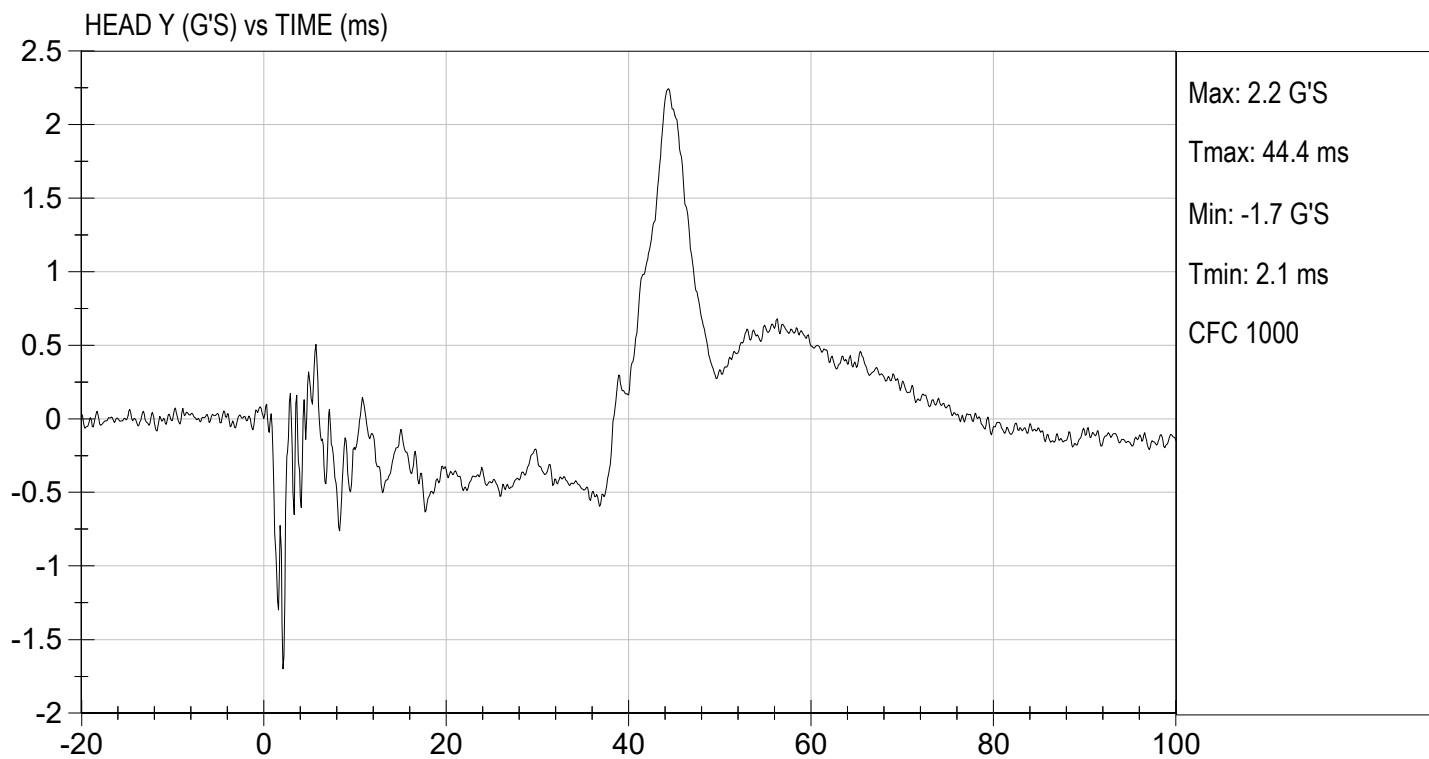
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Peak Resultant Acceleration	G's	250 to 300	287	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	2.2	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results			Pass	


Laboratory Technician

03/30/2023
Test Date


Approved By





MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

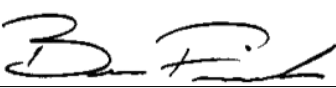
ATD Serial No: 142

Test I.D: D230812

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Velocity	10 ms	m/s	2.1 to 2.5	2.3	Pass
	20 ms	m/s	4.0 to 5.0	4.6	Pass
	30 ms	m/s	5.8 to 7.0	6.9	Pass
D Plane Rotation	Max	deg	77 to 91	79	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	69	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	84	Pass
Overall Results					Pass


 Laboratory Technician

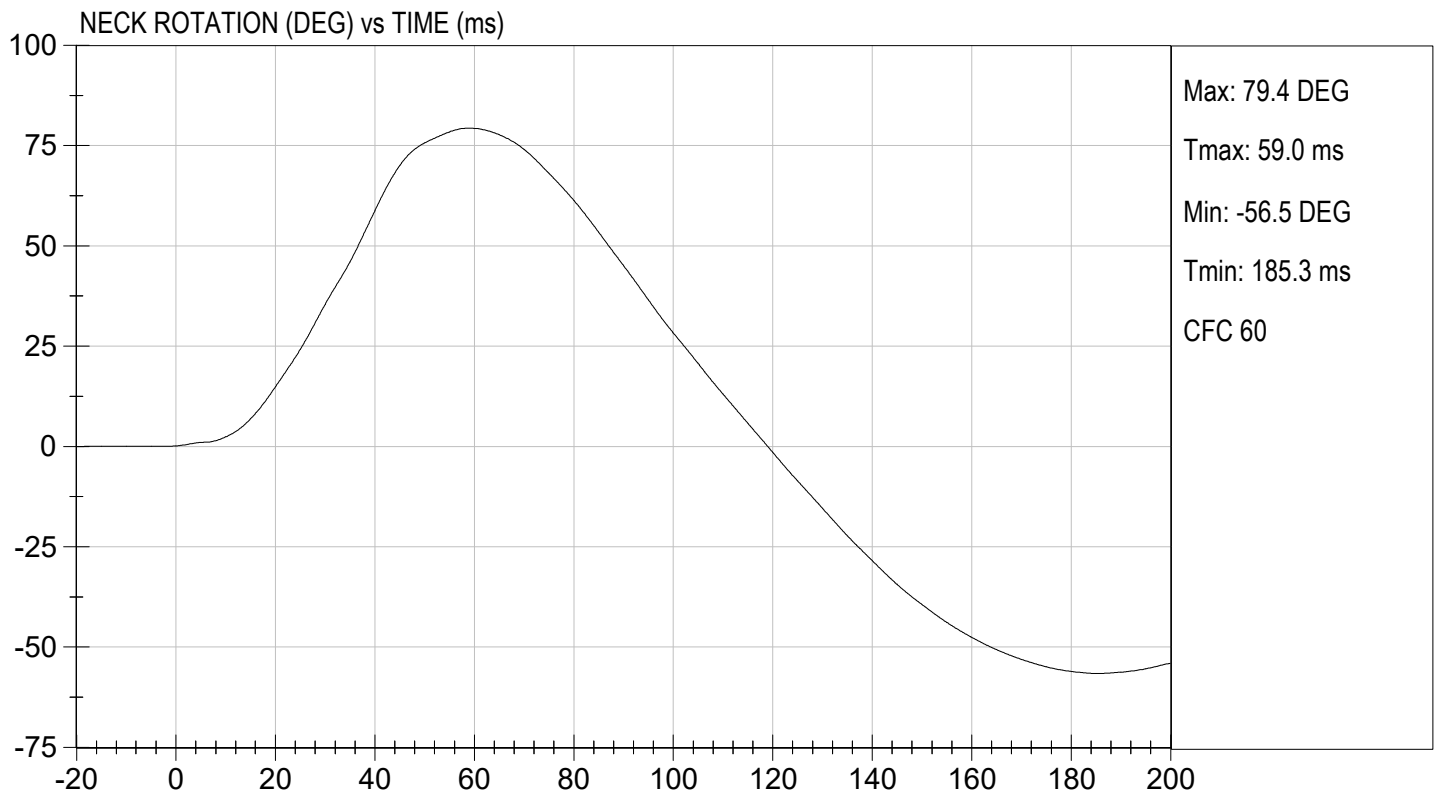
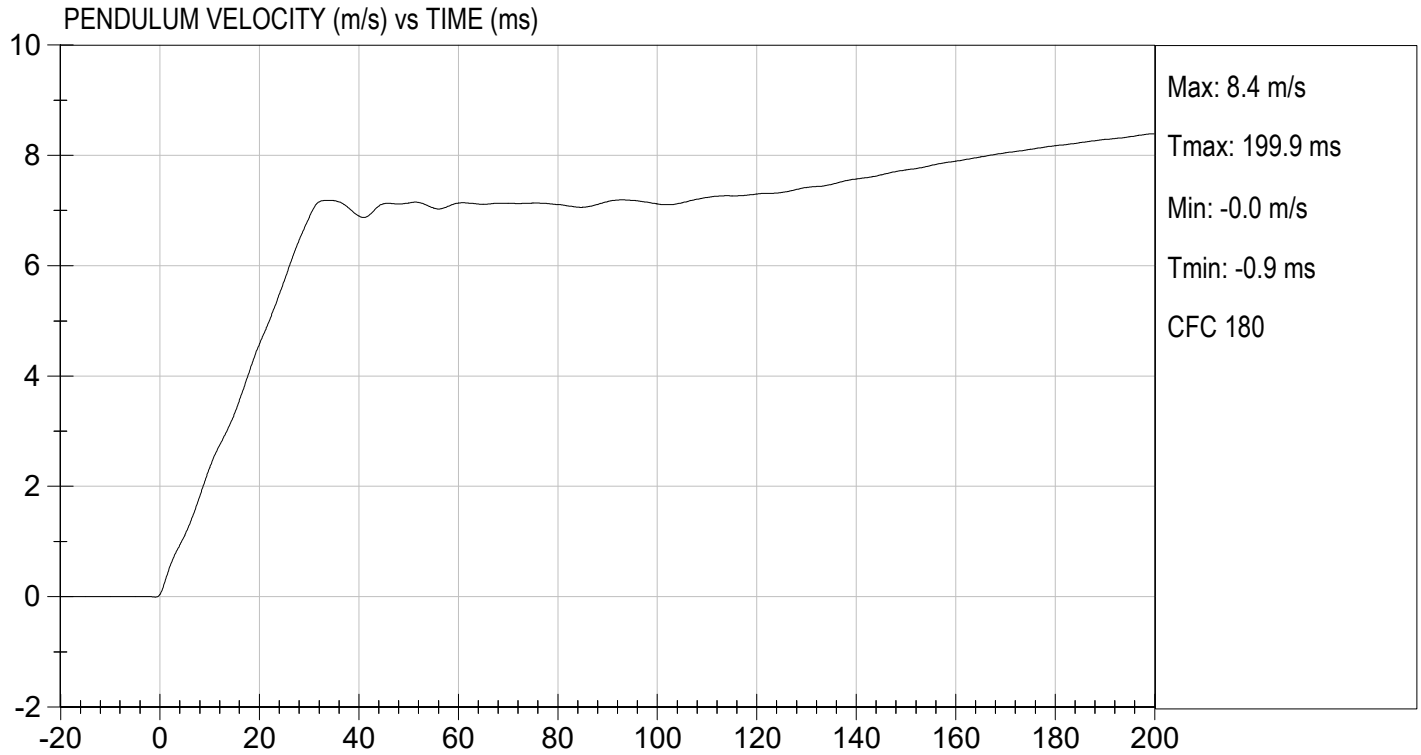
03/31/2023
 Test Date


 Approved By



TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

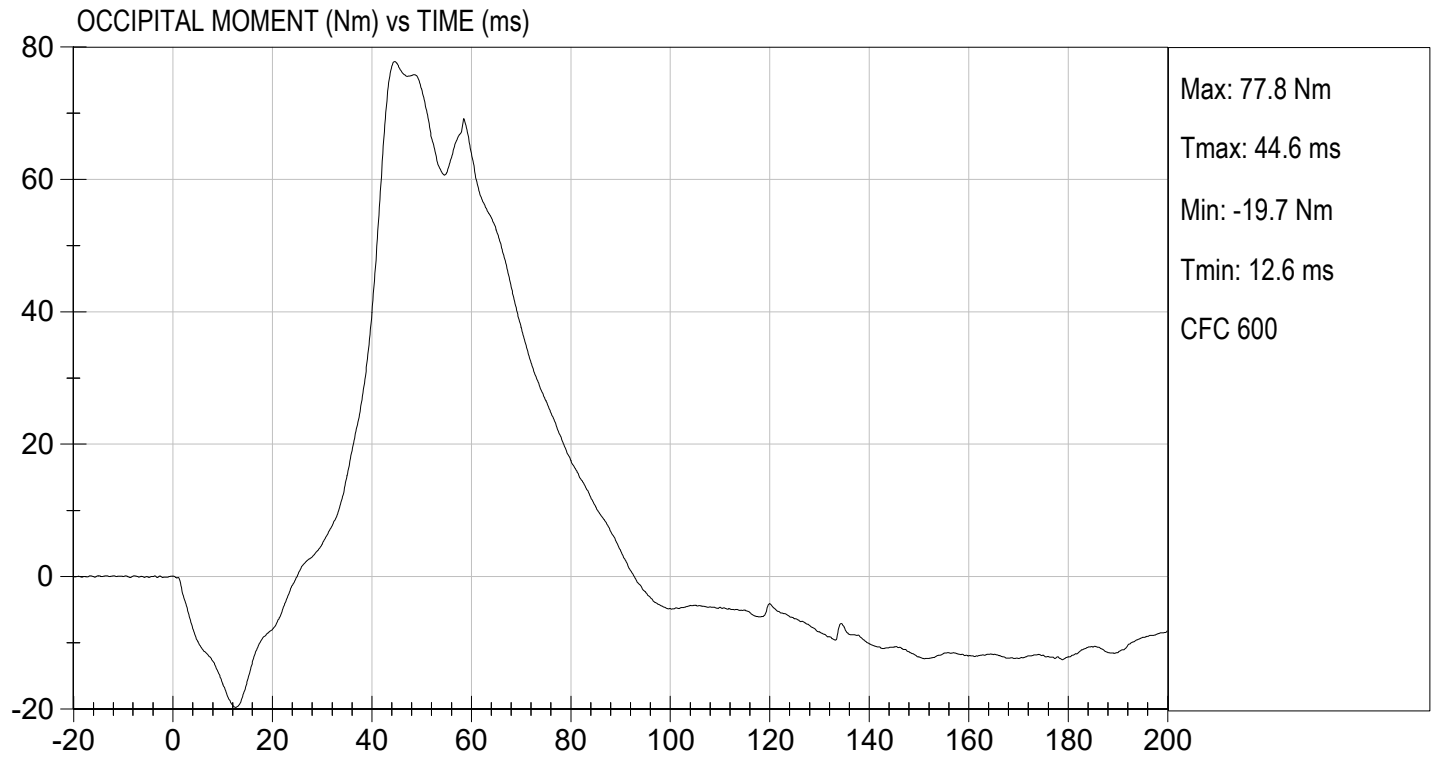
TEST DATE: 03/31/2023
TEST #: D230812





TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

TEST DATE: 03/31/2023
TEST #: D230812



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

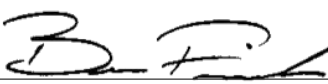
ATD Serial No: 142

Test I.D: D230813

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	33	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.7	Pass
	20 ms	m/s	3.1 to 3.9	3.6	Pass
	30 ms	m/s	4.6 to 5.6	5.3	Pass
D Plane Rotation	Max	deg	99 to 114	107	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-54	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	104	Pass
Overall Results					Pass


Laboratory Technician

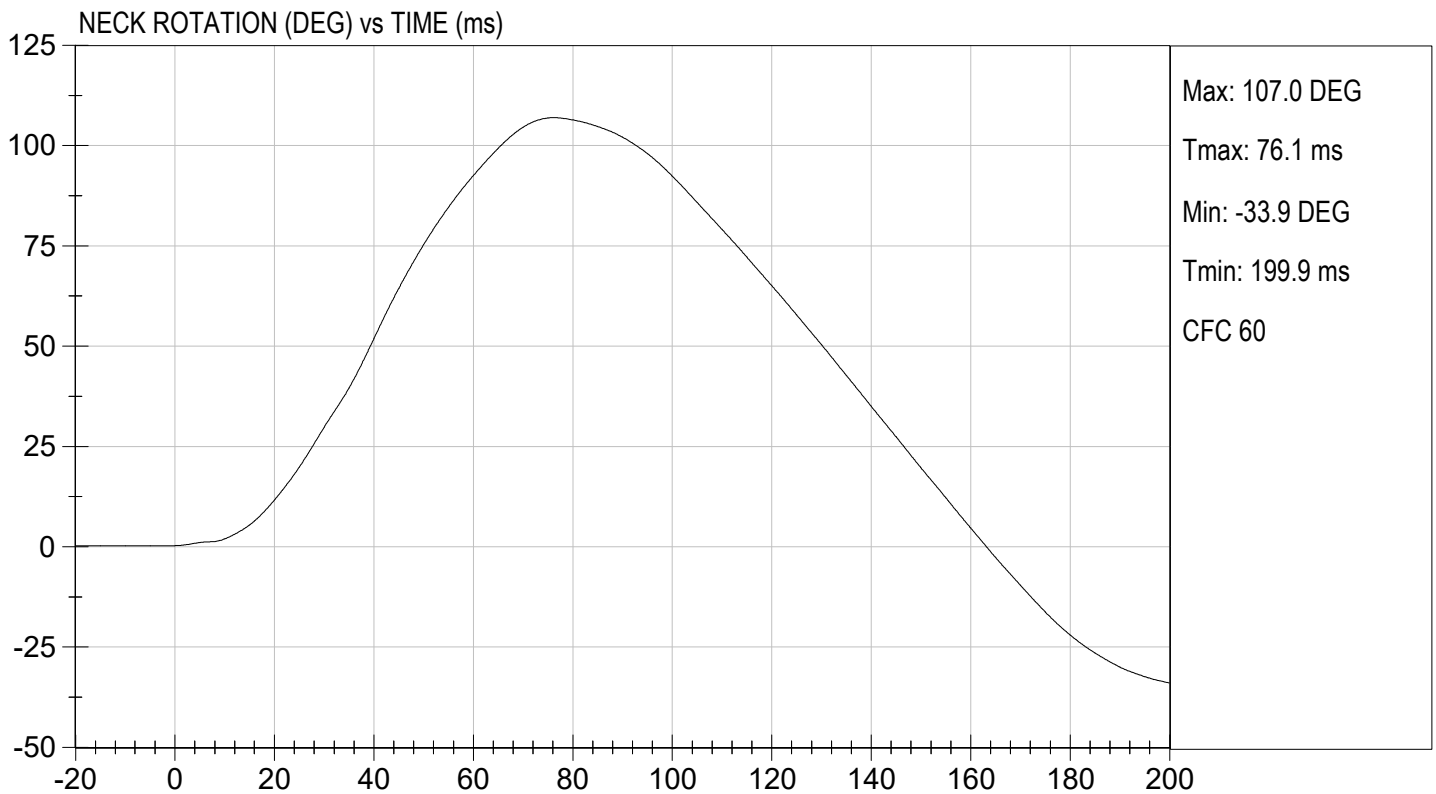
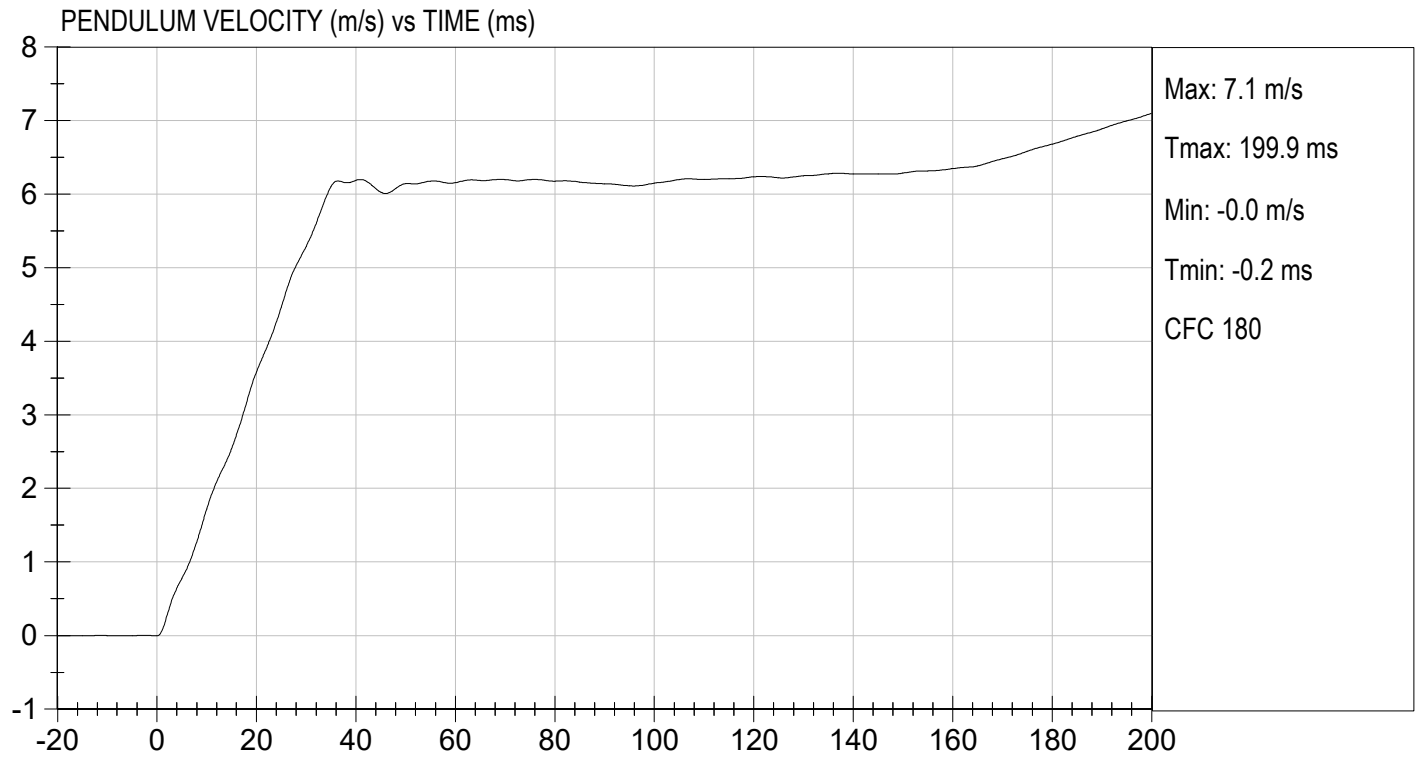
03/31/2023
Test Date


Approved By



TEST DESC: NECK EXTENSION
VELOCITY: 20.08 ft/s, 6.12 m/s

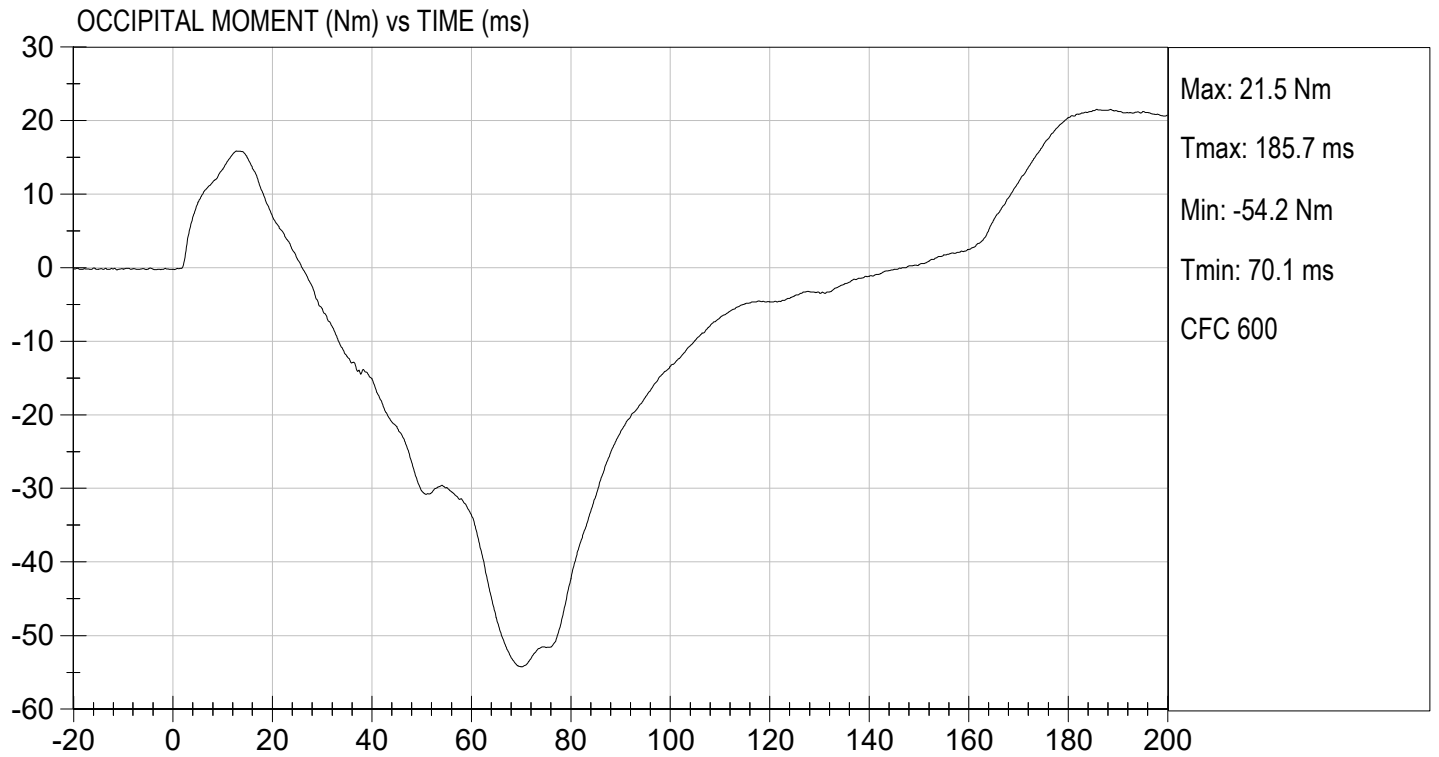
TEST DATE: 03/31/2023
TEST #: D230813





TEST DESC: NECK EXTENSION
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 03/31/2023
TEST #: D230813

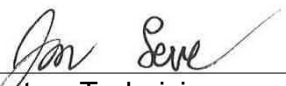


MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 142

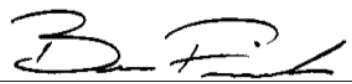
Test I.D: D230814

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Relative Humidity	%	10 to 70	37	Pass
Probe Speed	m/s	6.59 to 6.83	6.68	Pass
Peak Deflection	mm	50 to 58	51	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4249	Pass
Internal Hysteresis	%	69 to 85	76	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4355	Pass
Overall Test Results				Pass


Laboratory Technician

03/31/2023

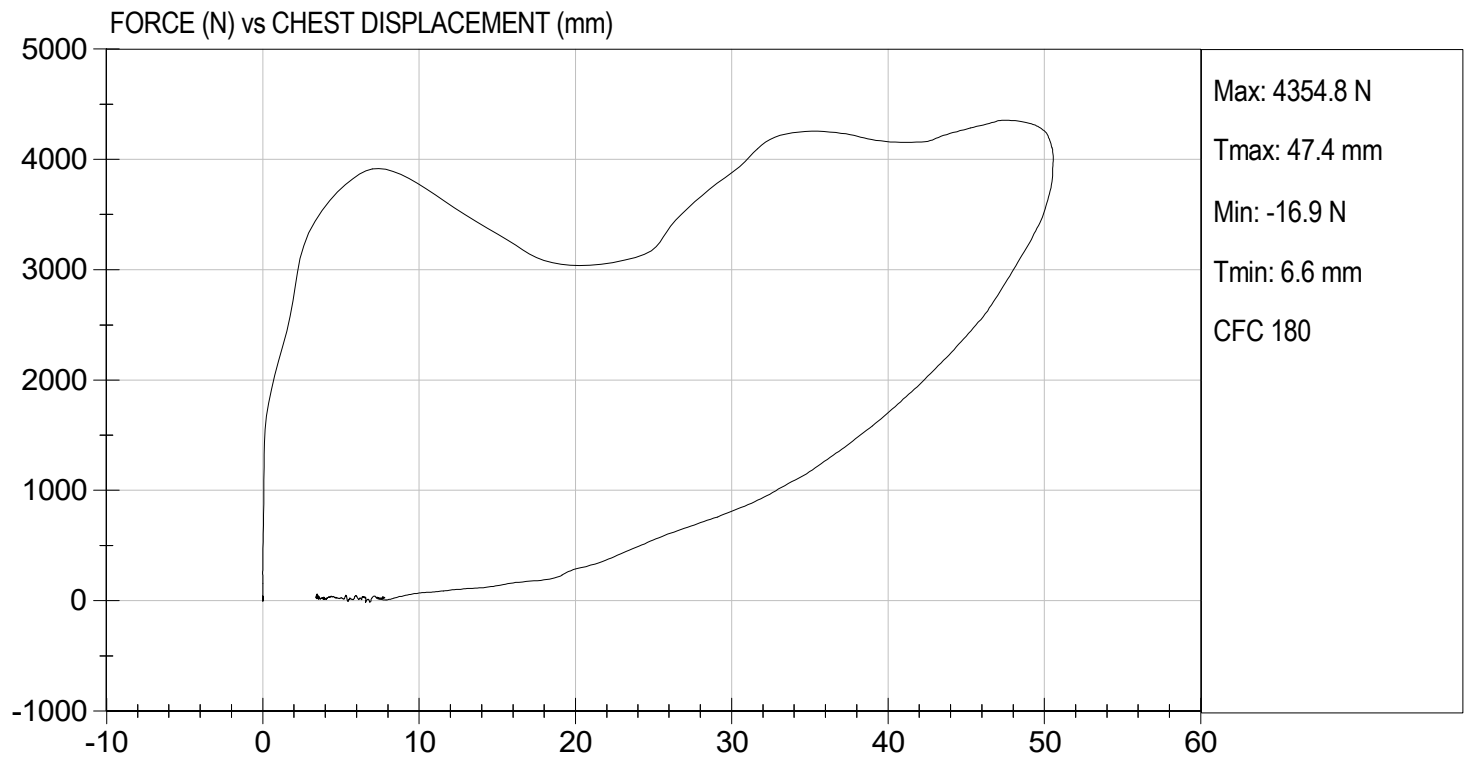
Test Date


Approved By



TEST DESC: THORAX IMPACT
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 03/31/2023
TEST #: D230814



MGA RESEARCH CORPORATION

**RIGHT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE**

ATD Serial No: 142

Test I.D: D230815

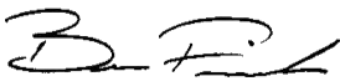
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	4042	Pass
Overall Test Results				Pass



Laboratory Technician

03/29/2023

Test Date

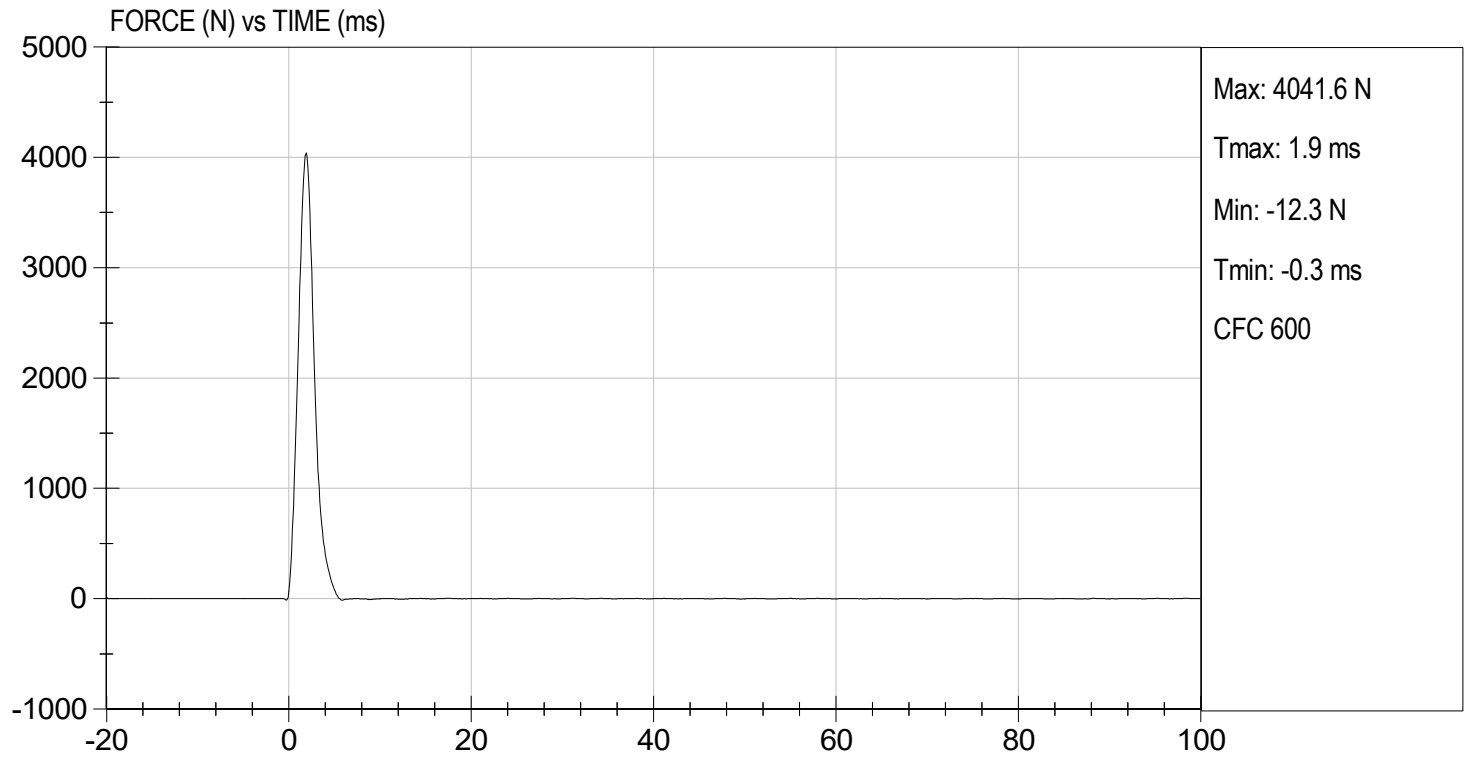


Approved By



TEST DESC: RIGHT KNEE
VELOCITY: 6.94 ft/s, 2.12 m/s

TEST DATE: 03/29/2023
TEST #: D230815



MGA RESEARCH CORPORATION

**LEFT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE**

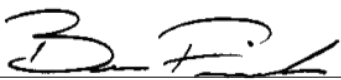
ATD Serial No: 142

Test I.D: D230816

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Probe Speed	m/s	2.07 to 2.13	2.11	Pass
Maximum Force	N	3450 to 4060	3774	Pass
Overall Test Results				Pass


Laboratory Technician

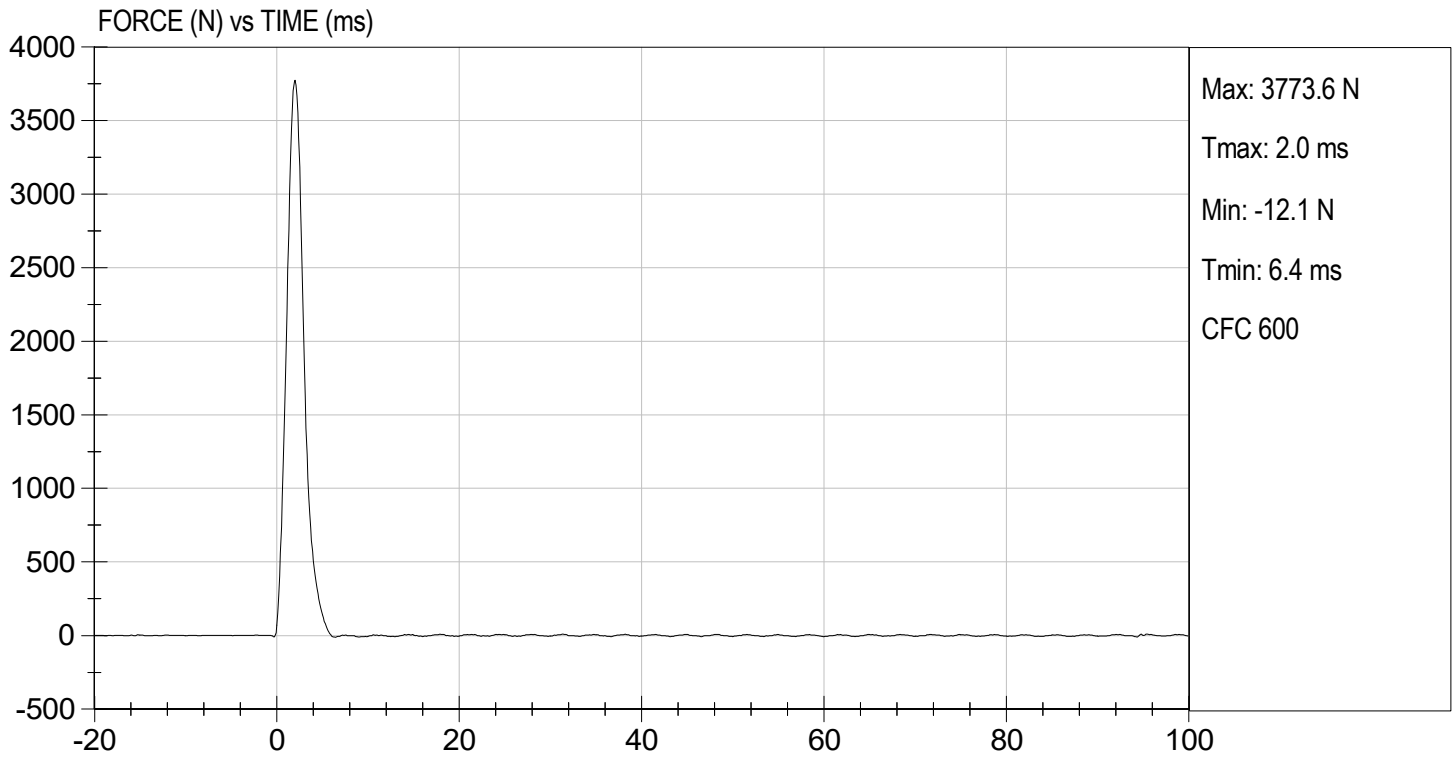
03/29/2023
Test Date


Approved By



TEST DESC: LEFT KNEE
VELOCITY: 6.92 ft/s, 2.11 m/s

TEST DATE: 03/29/2023
TEST #: D230816



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 142

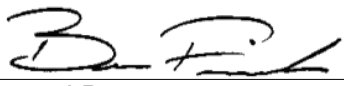
Test I.D: D230817

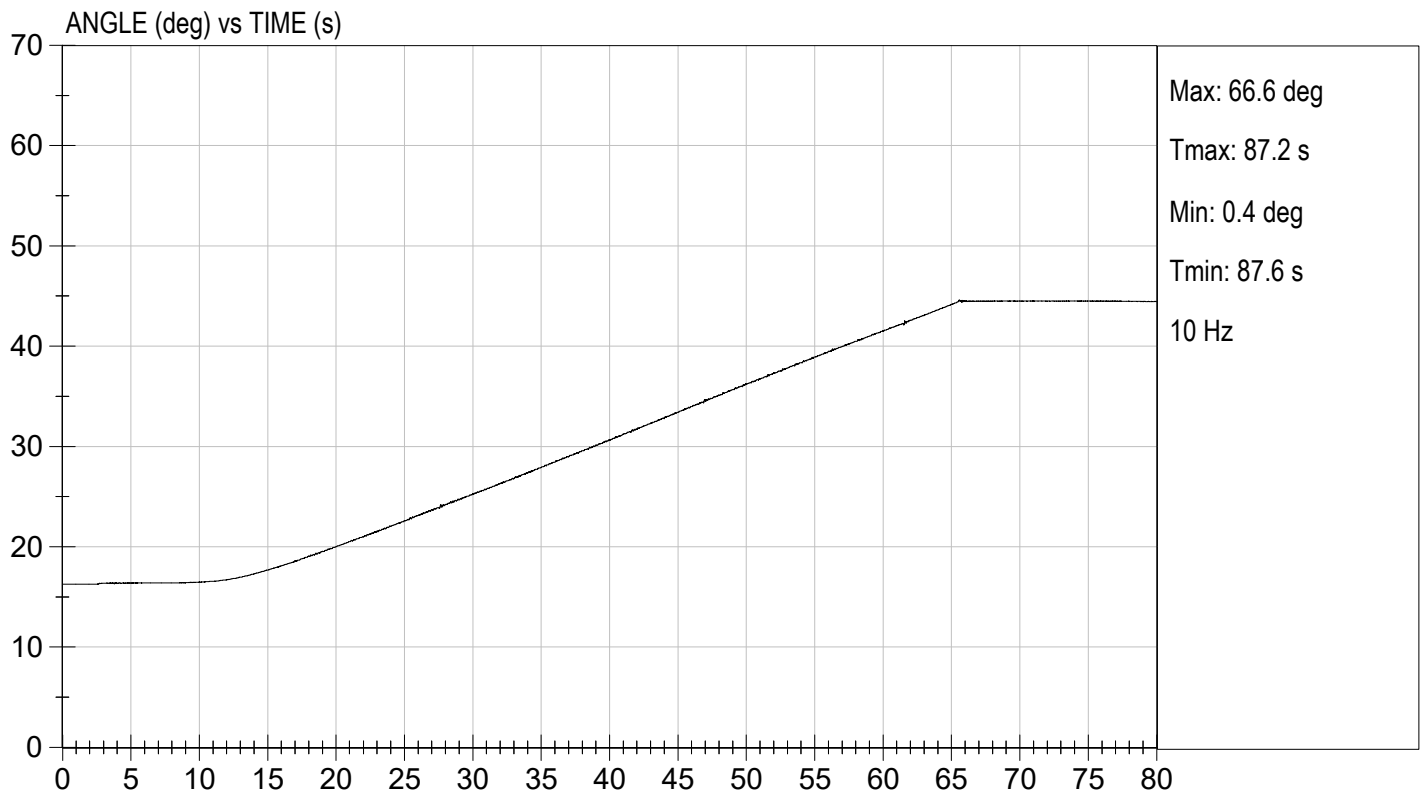
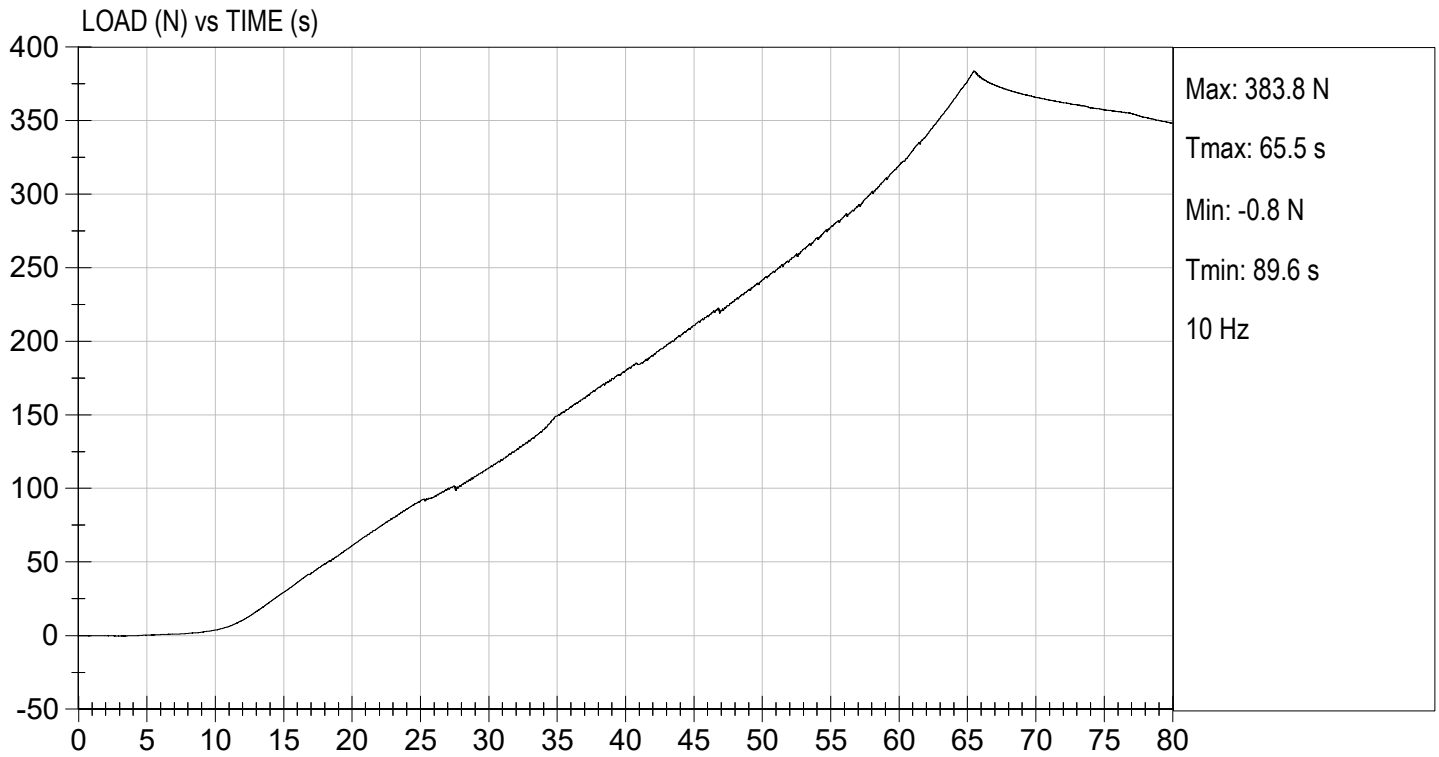
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Initial Angle	deg	0 to 20	16	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	383	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.5	Pass
Overall Result			Pass	


Laboratory Technician

03/29/2023

Test Date


Approved By



APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

TABLE 1 – DRIVER DUMMY INSTRUMENTATION

Instrument Location			Axis	Hybrid III 50 th S/N 351		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers	Primary		X	P79741	Endevco	12/29/2022
			Y	P79743	Endevco	12/29/2022
			Z	P79744	Endevco	12/29/2022
	Redundant		X	P94834	Endevco	12/29/2022
			Y	P94856	Endevco	12/29/2022
			Z	P97412	Endevco	12/29/2022
Head Angular Rate Sensors			X	ARS7442	DTS	09/06/2022
			Y	ARS7475	DTS	09/06/2022
			Z	ARS7516	DTS	09/06/2022
Upper Neck Load Cell			Fx, Fy, Fz Mx, My, Mz	NG2022	Denton	09/21/2022
Chest Accelerometers	Primary		X	P86792	Endevco	12/29/2022
			Y	P88348	Endevco	12/29/2022
			Z	P86793	Endevco	12/29/2022
	Redundant		X	P88666	Endevco	12/29/2022
			Y	P94109	Endevco	12/29/2022
			Z	P88667	Endevco	12/29/2022
Chest Potentiometer			X	351	Humanetics	12/29/2022
Pelvis Accelerometers			X	P95526	Endevco	12/29/2022
			Y	P96038	Endevco	12/29/2022
			Z	P97742	Endevco	12/29/2022
Femur Load Cells	Right	Primary	Z	FG121P	Denton	12/29/2022
		Redundant	Z	FG121R	Denton	12/29/2022
	Left	Primary	Z	FG122P	Denton	12/29/2022
		Redundant	Z	FG122R	Denton	12/29/2022
Tibia Load Cells	Right	Upper	Mx, My, Fz	TG467	Denton	12/21/2022
		Lower	Mx, My, Fz	AG491	Denton	12/21/2022
	Left	Upper	Mx, My, Fz	TG478	Denton	12/21/2022
		Lower	Mx, My, Fz	AG500	Denton	12/21/2022
Foot Accelerometers	Right	Rear	X	T22486	Endevco	12/29/2022
			Z	P97382	Endevco	12/29/2022
		Front	Z	P82120	Endevco	12/29/2022
	Left	Rear	X	T16468	Endevco	12/29/2022
			Z	T16496	Endevco	12/29/2022
		Front	Z	T16501	Endevco	12/29/2022
Seat Belt Load Cells		Lap		SBG161	FTSS	11/13/2019
		Shoulder		SBG157	FTSS	11/13/2019

TABLE 2 – FRONT PASSENGER DUMMY INSTRUMENTATION

Instrument Location			Axis	Hybrid III 5 th S/N 142		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers	Primary		X	P94799	Endevco	10/10/2022
			Y	P94800	Endevco	10/10/2022
			Z	P94801	Endevco	10/10/2022
	Redundant		X	P94802	Endevco	10/10/2022
			Y	P94803	Endevco	10/10/2022
			Z	P97377	Endevco	10/10/2022
Head Angular Rate Sensors			X	ARS7325	DTS	09/06/2022
			Y	ARS7340	DTS	09/06/2022
			Z	ARS7354	DTS	09/06/2022
Upper Neck Load Cell		Fx, Fy, Fz Mx, My, Mz	NG1915	Denton	02/22/2023	
Chest Accelerometers	Primary		X	P88719	Endevco	10/10/2022
			Y	P94785	Endevco	10/10/2022
			Z	P94793	Endevco	10/10/2022
	Redundant		X	P95322	Endevco	10/10/2022
			Y	P95370	Endevco	10/10/2022
			Z	T30901	Endevco	10/10/2022
Chest Potentiometer		X	142	Humanetics	10/11/2022	
Pelvis Accelerometers			X	P82646	Endevco	10/10/2022
			Y	P94798	Endevco	10/10/2022
			Z	P97705	Endevco	10/10/2022
Femur Load Cells	Right	Primary	Z	FG126P	Denton	10/11/2022
		Redundant	Z	FG126R	Denton	10/11/2022
	Left	Primary	Z	FG127P	Denton	10/11/2022
		Redundant	Z	FG127R	Denton	10/11/2022
Tibia Load Cells	Right	Upper	Mx, My, Fz	TG405	Denton	02/22/2023
		Lower	Mx, My, Fz	AG368	Denton	02/22/2023
	Left	Upper	Mx, My, Fz	TG475	Denton	02/22/2023
		Lower	Mx, My, Fz	AG504	Denton	02/22/2023
Foot Accelerometers	Right	Rear	X	P94795	Endevco	10/10/2022
			Z	P94796	Endevco	10/10/2022
		Front	Z	P94797	Endevco	10/10/2022
	Left	Rear	X	P83167	Endevco	10/10/2022
			Z	P83168	Endevco	10/10/2022
		Front	Z	P83169	Endevco	10/10/2022
Seat Belt Load Cells		Lap		SBG273	FTSS	11/13/2019
		Shoulder		SBG272	FTSS	11/13/2019

TABLE 3 – VEHICLE INSTRUMENTATION

Instrument Location			Axis	Serial Number	Manufacturer	Calibration Date
Crossmember / Rear Seat Accelerometers	Left	Primary	X	A416920	MSI	12/15/2022
			Z	A377290	MSI	11/23/2022
		Redundant	X	A383090	MSI	12/15/2022
	Right	Primary	X	P79711	Endevco	01/04/2023
			Z	A340265	MSI	10/07/2022
		Redundant	X	A393847	MSI	10/07/2022
Engine Accelerometers		Top	X	A383097	MSI	10/20/2022
		Bottom	X	T32189	Endevco	11/01/2022